LETTERS AND PAPERS

ON

Agriculture, Planting, &c.

ADDRESSED TO THE

Bath and Weſt of England Society,

FOR THE ENCOURAGEMENT OF

Agriculture, Arts, Manufactures, and Commerce.

VOLUME II.

LETTERS AND PAPERS

ON

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SELECTED FROM

THE CORRESPONDENCE

OF THE

Bath and Weſt of England Society

FOR THE ENCOURAGEMENT OF

AGRICULTURE, ARTS, MANUFACTURES, AND COMMERCE.

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Jos: Banks

INTRODUCTION.

THE Preface to the first volume of theſe papers, and the ſubject matter of the whole, ſo fully expreſs the nature and deſign of the inſtitution of the Bath Society, as to preclude the neceſſity of ſaying much by way of Introduction. A few brief Remarks, however, may not be deemed impertinent.

A late ingenious Writer has juſtly remarked, that " Improvements in Tillage " ariſe, in general, from the ſlow operation " of doubting experience among men who " obtain their bread by the ſweat of their " brows, whoſe minds are not ſufficiently " enlarged to adopt, but with reluctance, " any deviation from the practice of their " forefathers, and who are fearful of riſquing

" the moderate certainty they poſſeſs for the
" proſpect of greater gains which are yet
" unknown."

The truth of this obſervation is evident; and ſhews the utility of Gentlemen's forming themſelves into ſocieties, and offering premiums for the introduction of experiments, which will ſecure the practical farmer from loſs in caſe of their failure. And many Members of ſuch Societies being men of conſiderable landed property, have a ſufficient influence to propagate the reſulting advantages in their reſpective neighbourhoods; and have it alſo in their power to make experiments, which it would perhaps be imprudent for common farmers to make at their own riſque.

Such Gentlemen, therefore, as patronize eſtabliſhments of this kind, do themſelves greater honour than their modeſty will permit them to ſee it in its full luſtre; and are peculiarly entitled to the thanks of their country. At a very trifling expence they become the primary means of increaſing the wealth and happineſs of the community; who feel, through every rank and order, the beneficial effects of every improvement that tends to increaſe the value and the produce of our lands.

To the Beneficed Clergy alſo, of every rank, the encouragement of ſuch Societies ought to become the object of ſpeedy and general attention. They are eſſentially intereſted in whatever tends to promote the improvement and value of lands, being ſure to partake of the increaſed produce, without the leaſt loſs from the failure of any experiment. It therefore ſeems incumbent on them to lend their aſſiſtance in ſupporting an inſtitution which muſt increaſe the value of their livings in proportion as its exertions become beneficial to the publick.

To their ſeveral correſpondents, (whoſe letters are in general printed in their own words, and invariably ſo with regard to experiments) the Society return their thanks; and hope the following pages will furniſh uſeful information to Practical Farmers.— They alſo hope, by future communications from ſuch Gentlemen as have made Agriculture and Planting their employment and ſtudy, to be enabled to continue their publication in future volumes.

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LETTERS

TO THE

BATH AND WEST OF ENGLAND AGRICULTURE SOCIETY.

ARTICLE I.

Propoſal for further Experiments on the Advantages of cultivating Carrots.

[By ARTHUR YOUNG, eſq.]

GENTLEMEN,

THE publication of your firſt volume of Memoirs has convinced the world, that you do not only labour with aſſiduity to perfect the Agriculture of the Counties to whoſe uſe your eſtabliſhment is more particularly dedicated; but that you alſo embrace, in a liberal manner, the publick good of the whole community. A Society that does not publiſh its tranſactions may be of a partial, limited, and confined utility, but can never diffuſe the knowledge it rewards, nor render the ſucceſsful efforts of individuals the means of general improvement. For want of this circumſtance, the London Society (of which I have been for ſome years an attending member) has failed in a remarkable degree, of ſeeing it's noble and liberal premiums attended with any conſiderable effect. I am, however, happy enough to add, that they have entered upon that eſſential work at laſt, ſo that the world may hereafter expect to partake in that maſs of valuable information which they have hitherto been too little ſolicitous to ſpread.

In your firſt volume are two memoirs on the cultivation of Carrots, an object which always appeared to me to rank amongſt the moſt important in Britiſh Agriculture; but which, for certain reaſons, has made much leſs progreſs than it's excellence would lead one to expect. The hiſtory of this branch of our huſbandry is diſpatched in a few words.

It appears from *Norden's Surveyor's Dialogue*, publiſhed in 1600, that carrots were commonly cultivated, at that time, about Orford in Suffolk, and about Norwich in Norfolk; and it is very remarkable, that the tract of ſand between Orford,

ford, Woodbridge, and Saxmundham, has, I apprehend, to this day, more carrots in it than all the reſt of the kingdom put together;*—a ſtriking inſtance of the locality of practices in agriculture, and of that extreme tardineſs with which any particular branch of cultivation moves from one place to another.

In the ſummer of 1779, I examined that country with a Ruſſian gentleman, to whom I had the pleaſure of explaining the admirable management of thoſe ſand farmers; and it was with much ſatisfaction that I found the culture of carrots rather increaſing amongſt them than the contrary, which I took the more notice of, as I had viewed it ten years before. One farmer had 36 acres, many of them from 10 to 20, few leſs than 5 or 6, and ſcarcely one that was without any. The ſtrait, handſome, clean roots are ſold at 6d. a buſhel to London, and all the reſt uſed upon the farm, chiefly for feeding the teams of horſes, at an allowance of a buſhel per horſe per day. Theſe horſes are of the fineſt cart breed, perhaps, in the world, do heavy work, and never have any oats allowed them when at carrots.

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* Perhaps the quantity of carrots raiſed in the neighbourhood of Chard, and brought to that market, may be nearly equal, and the roots ſuperior in quality.

In the regiſter of my *Eaſtern Tour*, I have given ſeveral accounts of the experiments on this root by ſundry gentlemen, but moſt of them practiſed the huſbandry in a deſultory unconnected manner, inſtead of making them the part of a regular ſyſtem.

In countries where turnips are not well eſtabliſhed, it is common to ſee a man have a few acres this year, and none the next;—a ſure proof the culture is little underſtood. In the ſame journey I viewed the farm of Mr. Billing, who gained the premium of the London Society, for carrots, which he cultivated with great ſpirit for a few years, and then totally dropped them. Thus, gentlemen, we find that the culture of this valuable plant has made little or no progreſs, except in that angle of Suffolk, where it was eſtabliſhed two hundred years ago.

In order to promote the huſbandry in future, we muſt enquire into the circumſtances that have hitherto retarded it.

I cannot attribute this to the expences of the crop, though they are high:—Other articles of cultivation have ſpread greatly under expences double, treble, and quadruple thoſe of carrots, ſuch as hops: Beſides, there are many gentlemen, not to mention ſubſtantial farmers, who would diſregard the expence, were they aſſured of the advantage. But the charge is not ſo great as generally thought, when managed with an eye to an extenſive culture, and not a confined one for one or two particular objects. Let us compare them in this reſpect with turnips. Theoretical calculations are rarely ſo ſatisfactory as the actual tranſcripts of experience. I had this year a field of eleven acres, ſix of which were fallowed for turnips, three under the cluſtered potatoe, and two in carrots; the laſt have coſt me per acre as follows:

	£.	s.	d.
Rent, tithe, and rates ——	1	7	0
One ploughing, (double the common price)	0	8	0
Seed, four pounds, at 1s. 6d. ——	0	6	0
Sowing —— ——	0	0	6
Harrowing —— ——	0	1	0
Three hoeings and one weeding ——	1	5	0
Digging up —— ——	0	10	0
	£ 3	17	6

When dug and left on the ground, I conſider them in the ſame ſtate of preparation as turnips growing. I carted, cleaned, topped, and laid up part of this crop, but thoſe expences have nothing to do in the compariſon with turnips. Before I proceed, allow me a few remarks.

Fifteen years ago I cultivated carrots upon another farm of this eſtate, but I was then ſo young a farmer that my expences ran much higher than theſe: I had a bailiff who had a great opinion of contract work; by his advice I hoed and took up by the acre. But experience has long ſince told me, that that mode of doing work is as extravagant in any unuſual buſineſs, as it is beneficial in the common routine of a farm. At Woodbridge, hoeing carrots from general practice has as fixed a price as turnips, viz. a guinea an acre for three hoeings; but where the cultivation is unknown, day work I have found greatly preferable to contract. I ſhould however obſerve, that if the ſummer had not been remarkably dry, my expence of hoeing might have been higher, for my ſoil, a gravelly, ſandy loam, with ſtones, is much worſe to hoe than the pure ſands of Woodbridge: the chief difficulty aroſe from the quantity of the *Polygonum aviculare*, which was the predominant weed, ſo tough a one that ſcarcely any hoe will cut it. Your correſpondent Mr. Billingſley reports expences which amaze me; 13s. an acre for ſowing can ſcarcely anſwer; certainly with Mr. Ducket's drill it might be done for a third of that expence: Digging up 30s. an acre is equally extravagant.

To return:—The turnips were twice ſown, a part of them thrice, but were all eaten by the fly.† I muſt therefore minute what would have been the expences had the crop ſucceeded. It is eaſy to do this with great accuracy.

	£.	s.	d.
Rent, tithe, and rates	1	7	0
Five ploughings, 4s. each	1	0	0
Seven harrowings at different times	0	4	0
Rolling with two horſes	0	0	4
Seed and ſowing	0	0	9
Hoeing firſt 4s. 6d. ſecond 2s. 6d.	0	7	0
	£2	19	1
The expence of carrots	3	17	6
Exceſs,	£0	18	5

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† As ſoon as I found the fly had begun to attack them, I gathered elder in full bloſſom, and laid it thickly in ſpots of the field; in ſome places the flowers maſhed, in others the leaves the ſame, and I added it freſh and freſh; but no attention of this ſort would preſerve me a ſingle plant. The fly ſeemed to devour the plants as freely in thoſe ſpots as in any other.

If we call the ſuperiority of expence 20s. an acre, I believe we ſhall be very near the truth; and it muſt be at once apparent that the exceſs of 20s. in expence cannot be the cauſe of the culture ſpreading ſo little; for, to anſwer this expence, there are favourable circumſtances which muſt not be forgotten.

1ſt. They are much more impenetrable to froſt. I never heard of any damage received by the crops at Woodbridge, where they are always left in the ground to be taken up as wanted. Laſt winter our crops of turnips were univerſally deſtroyed; and they ſuffer exceedingly whenever a froſt is ſevere. This renders carrots ſo much more certain and to be depended on, that no man poſſeſſed of a good crop but muſt feel himſelf on velvet, while the ſtock of other men are ſtarving.

2dly. They are not ſubject to any diſtempers, or accidents that approach to the evils of the anbury and the fly in turnips. They are alſo ſown at a ſeaſon when they cannot ſuffer by drought. Of late years turnips have ſuffered ſo much by all theſe attacks, as to have ſubjected the farmers of this county and Norfolk to moſt heavy loſſes.

3dly. They laſt to a ſeaſon of difficulty, (April) when ſtock, and eſpecially ſheep farmers are ſo diſtreſſed, that they know not what reſource to provide;—a circumſtance of ſuperiority which every practical farmer muſt be ready enough to admit.

4thly. But perhaps the greateſt ſuperiority of all is to be drawn from the nature of ſandy ſoils, the principles which ſhould guide their cultivation being in general moſt miſerably miſunderſtood. On theſe ſoils there is an inherent defect in the culture of turnips as commonly carried on. The true theory of tillage for ſand, is to give it *tenacity*; but unfortunately the ſummer ploughings and harrowings ſo liberally given for turnips are in the ſpirit of the clay culture *friability.* Every ploughing that is given to ſand, after the ſpring moiſture is over, is certainly miſchievous, in letting the ſun deep into the ſoil, adding to it's looſeneſs, volatilizing, and conſequently carrying off any mucilaginous particles there may be in it, and letting looſe that degree of adheſion which the preceding winter's rains might have occaſioned. The farmers ſubmit to theſe ills, in order to effect the benefit of deſtroying weeds; and when a ſandy field has much couch-graſs *(triticum repens)* in it, they are forced to repeat their tillage to a degree that would make one believe they wiſhed to deſtroy every principle of adheſion in the ſoil. Any huſbandry, therefore, that would exclude all this tillage, and at the ſame time keep the weeds under, is evidently an improvement upon this ſyſtem. Upon good ſands there is ſcarcely a better practice than ſowing winter-vetches for ſoiling, and ploughing the land only once after the vetches for turnips; this excludes much tillage, but is inferior to carrots, which admit no ſummer ploughing whatever: One earth given with a trench-plough in March, and ample hoeings on the ſurface through the ſummer, ſeem to be the management of all others the moſt proper for this ſoil; and if the crop be left late in the ground, and the ſoil be very ſandy, to ſucceed it with buck-wheat, for which any degree of cleaning from couch may be given if neceſſary. It muſt not from hence be imagined that I am an enemy to the Turnip Huſbandry; which, in truth, is one of the greateſt improvements that ever was introduced into the agriculture of this kingdom. I am no more than endeavouring to ſhew that there are advantages attending carrots, which do not flow from the other culture; and which render them an object of very great conſequence, though not to be purſued to the excluſion of turnips.

When theſe circumſtances are conſidered, it will not be found that the exceſs of the expence of the carrot culture can be eſteemed any reaſon for their not having been more attended to in this kingdom. That exceſs in fact vaniſhes, for I am clearly of opinion, that there is no intelligent turnip farmer that would not give a conſiderable portion of it, if not the whole, annually per acre, on their turnips, to have them inſured againſt all thoſe failures and accidents to which carrots are not liable.

Now, if it be not to be attributed to the expence, that this cultivation does not extend, it will neceſſarily be aſked, *to what is it owing?* My anſwer to this queſtion will be, without heſitation, BECAUSE THE VALUE IS NOT ASCERTAINED. All other objections to a crop become as nothing when compared to this: For a man to attend with ſome degree of anxiety, much trouble, and great expence, to procure a produce, which when gained is of little or doubtful value, is to take pains to place one's ſelf in an odious and grating ſituation. It is what no man will voluntarily do. The farmers put wheat, barley, or oats, in the ground, becauſe they know thoſe crops will certainly repay them, if not a great, at leaſt a moderate profit: They ſow turnips and clover, becauſe a great maſs of general and particular experience tells them, that in the feeding of any ſort of cattle thoſe plants will amply pay them for any moderate expences. But if you recommend carrots, they at once ſay, *What are they worth? How will they pay?* The ſociety that offers premiums for the cultivation, or the individual who recommends it, ought to be able to anſwer this queſtion; and if they cannot do that, they ought to gain the neceſſary knowledge as the firſt ſtep towards diffuſing the practice.

The misfortune is, that the value remains yet unaſcertained; from a general review of the experiments before the publick, a ſatisfactory deciſive knowledge of this point is not to be gained. As this is a circumſtance of conſiderable importance, it will not be improper to give it a ſlight examination.

The moſt conſiderable practice, and the only one of common farmers, upon a large ſcale, is that of the ſands in the neighbourhood of Woodbridge; unfortunately for aſcertaining the value of the root from their crops, the ſale to the London market always enters into their view in the cultivation. The ſtrait, clean roots are ſold at ſix-pence per buſhel at the quays, upon the Woodbridge river, into ſhips that carry them to London; and the refuſe of the crops are what they feed their horſes with; all we therefore learn is, that it will anſwer to ſell them at ſix-pence, and that they are a nouriſhing and proper food for horſes, inſtead of oats. But the ſale is what we muſt keep clear of, for that is confined to certain ſituations within the reach of very great cities, as all the ſmaller towns are ſupplied by gardeners.

Amongſt thoſe whoſe experiments are publiſhed Mr. Billing ranks foremoſt. Here again, the value of carrots is rather depreciated than advanced; for he raiſed great crops, had repeated experience upon a large ſcale of their excellence in fattening oxen and ſheep; feeding cows, horſes, and hogs; and keeping ewes and lambs in a very ſuperior manner, late in the ſpring, after turnips were gone; but, notwithſtanding theſe great advantages, he gave the culture up; ſo that when I viewed his farm there was not a carrot upon it; from which we may conclude a deficiency in value.

In ſeveral experiments I regiſtered in my *Experimental Agriculture*, but which were not made with that preciſion which the importance of the ſubject merited, nor repeated often enough, I found the value upon an average, of all applications, to be 13d. a buſhel, heaped meaſure; eſtimating it at 70lb. it is 1l. 14s. per ton.

In my *Eaſtern Tour*, the experiments of ſeveral gentlemen on carrots are inſerted, and the following are their valuations:

	per ton.		
	£.	*s.*	*d.*
Mr. Melliſh of Blyth, a general valuation, horſes, cows, and hogs ——	1	0	0
Mr. Stovin of Doncaſter, hogs bought lean, fatted and ſold off ——	4	0	0
Mr. Moody of Retford, oxen fattened, and the account accurate ——	1	0	0
Mr. Taylor of Bifrons, ſaving of hay and corn in feeding horſes ——	1	0	0
Mr. Le Grand of Aſh, fattening wethers	0	13	9
Sir John Hoby Mill of Biſham, fattening hogs	1	6	0

To theſe let me add Mr. Billingſley's experiment in your firſt volume, 200lb. 3s. or per ton 1l. 13s. 6d.

Now, gentlemen, if we oppoſe to theſe accounts others of gentlemen, and I have met with ſuch, who could not in ſome of theſe applications make their carrots worth any thing; it will appear how unſettled the real value is.

For inſtance: Mr. Stovin by fattening hogs makes 4l. per ton, and Sir John Mill 1l. 6s. but Mr. Edmund Burke, at Beconsfield, could not make his hogs fatten at all on them; and ſome neighbours of mine have found them fit only, as they expreſs it, to *ſcour* hogs to death, inſtead of fattening; yet Mr. Le Grand, of Aſh, has ſold threeſcore porkers, moſt delicately fatted (that is his term) upon them.

When accounts ſo extremely contradictory are before the publick, I am ſurely juſtified in aſſerting that the value of carrots remains yet unaſcertained. It is true, I am much inclined to give great credit to the accuracy, knowledge, and other circumſtances, with which Mr. Moody appeared to me to deduce his valuation, which is alſo confirmed by ſeveral other reſpectable authorities; but ſtill, as the experiments, upon which any of theſe gentlemen founded their valuations, were not often repeated, and under different circumſtances, we muſt not conſider the reſult as perfectly deciſive.

No trial could be more completely conducted than Mr. Le Grand's upon wethers; but there are two circumſtances which make it doubtful whether his carrots had entirely fair play. The ſheep appear to have been put lean to them; whereas it is a fact well known, that if they are not half fat when put to turnips, no profit will reſult: *Quere*, if it be not nearly the ſame with carrots? He gave them alſo as much fine hay as they would eat: perhaps the ſheep will not pay for this;—the Norfolk practice with turnips is directly againſt it.

Upon the whole, we muſt conſider the information before the publick rather as matter of encouragement to proceed, than that explicit proof which prudent and inquiſitive cultivators will be apt to demand.

While this remains the caſe, the greateſt ſervice that can be done the publick in relation to carrots, is to form various experiments with the greateſt accuracy, in order to aſcertain their real value per ton. What an individual can do in this line is trifling, when compared with the deciſion that would reſult, gentlemen, from your taking it up with that ſpirit which ſeems to animate all your undertakings; and as you have a farm for the purpoſe of experiments, this would not be a difficult one to execute. But whether you attend by your officers to the conduct of ſuch trials, whether you incite others by premiums to it, or whether any of your correſpondents attempt it, permit me to obſerve, that there are one or two circumſtances that ſhould not be forgotten in the conduct of it.

1*ſt*. If ſheep are fattened, the carrots to be only dug up and left in the field, and the ſheep to be immediately penned within hurdles upon them; topping, cleaning, and packing up are expenſive, perhaps more ſo than can be paid by ſheep; and the land loſes an ample manuring for barley, of which farmers know the great value in the caſe of turnips; the ſoil muſt however be *quite* dry. If dirt adheres, they muſt be carried to a graſs field.

2*dly*. If oxen are fattened, the carrots to be laid up and given in ſtalls, with good hay in the racks.

3*dly*. Whether oxen or ſheep are the ſtock, they ſhould be half fat when put to carrots.

4*thly*. Whether oxen, ſheep, or hogs, are fed, they ſhould be weighed alive when they begin the carrots, and alſo when fat; and the value ſhould be taken when put up by the very beſt judges in the neighbourhood. The *price* bought or ſold ſhould not always be truſted to. Very good or very bad luck (as it is called) has ſuch an influence in buying or ſelling, that extreme falſe concluſions are ſometimes drawn, when ſo founded.

5*thly.* When given to horſes, they ſhould be conſidered as a ſubſtitute for oats, and the value ſo aſcertained, and not the ſaving of hay, which was Mr. Billing's method, becauſe they ought not to ſave any hay. The expence of waſhing not to be forgotten.†

If a ſeries of experiments were made to aſcertain the value of carrots in theſe various uſes, and the reſult publiſhed, it would do more to eſtabliſh the practice than any other meaſure whatever; a practice which I am convinced wants only to be well known in order to be generally purſued.

That no gentleman need be apprehenſive of ſuffering, if he makes ſome experiments in order to aſcertain this point, will appear from various conſiderations; it may not be improper to mention a few. I have ſhewn that they are to be cultivated for 4l. per acre, left on the ground for ſheep. Suppoſe the crop only two buſhels at 70lb. each per rod, three hundred and twenty per acre, or ten tons; it will readily be agreed ſuch a produce is very low to calculate upon, ſince twenty tons are common among carrot cultivators. It appears from Mr. Le Grand's experiments, that a wether worth 2l. 5s. eats 16lb. of carrots per day, and 4lb. of hay: Dropping the hay, and calculating for ſheep of leſs than half that ſize, (which are much more common) it will be perhaps an ample allowance to aſſign them 12lb. of carrots a day. If they are (as they ought to be) half fat when put up, they will be completely fattened in one hundred days. At this rate twenty wethers will in one hundred days eat eleven tons, or very little more than one moderate acre.* Now, gentlemen, let it be remembered that it is a good acre of turnips which will fatten eight ſuch wethers, the common Norfolk calculation; from which it appears that one acre of carrots is in this uſe of more worth than two of turnips.

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† Whoever would invent a cheap machine for waſhing carrots and potatoes in ſtagnant water would do a great public ſervice; the London Society offered at my recommendation, in 1776, premiums for ſuch a machine; and alſo in 1777, for aſcertaining the value of carrots, potatoes, and parſnips, but without effect.

Further: Let us ſuppoſe horſes fed with them inſtead of oats; to top, cart, and pack up ten tons of carrots, I know may be done for 20s.; an acre is therefore 5l. Fifty pounds weight of carrots are an ample allowance for a horſe a day; ten tons at that rate will laſt three horſes one hundred and fifty days, or five months. But theſe five pounds laid out in oats at 16s. a quarter, will purchaſe little more than ſix quarters, which will laſt three horſes, at two buſhels each per week, no more than two months; which is a moſt enormous inferiority to the carrots.

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* The late very ingenious Mr. J. W. Baker, found that fat ſheep of 20lb. a quarter would eat 20lb. of turnips a day.

Theſe eſtimates I do not offer as exactly correct; I produce them only as hints to experimental farmers, to convince them that no juſt apprehenſion of loſs can attend any trials on carrots, provided the ſoil be proper for them.

I beg, gentlemen, that you will pardon the imperfection of this ſlight ſketch upon a ſubject, to exhauſt which would demand a volume. If it prove the means of inſtigating others to give ſome attention to this very valuable article of cultivation, my aim will be fully anſwered.

I have the honour to be, Gentlemen,

Your obliged and devoted ſervant,

ARTHUR YOUNG.

Bradfield-Hall, near Bury,
November, 1781.

ARTICLE II.

On the amazing Fertility of a Piece of Ground at Wantage, in Berkſhire.

SIR, *Wilton, Jan. 1, 1783.*

AS you were pleaſed to receive favourably ſome trifles which I formerly ſent you, particularly an account of a very excellent ſort of graſs, at Orcheſton St. Mary in this county, which you thought proper to examine on the ſpot; I now trouble you with a few lines reſpecting a very fertile piece of arable.

Paſſing through Berkſhire, a few months ago, I was informed of this ground by ſome gentlemen farmers. The account they gave me ſeemed ſo extraordinary, that I was induced to go ſeveral miles out of my way to ſee it. It is a cloſe of two acres and a half by meaſure, ſituate at Wantage, and joins the turnpike-road leading from thence to London. It belongs to Mr. Stirling, attorney at law; a gentleman whoſe principles and veracity ſtand high in the eſtimation of his neighbours. I had no introduction to him but my curioſity. He with much politeneſs and good nature gave me the following account:—That, previous to his purchaſing this field, twenty-ſix years ago, it was ſown with barley five years ſucceſſively. That he then planted it the firſt year with beans, and it produced twelve quarters; next with wheat, of which it produced fourteen quarters; and that he has ſown it perpetually every year ſince, except one, when it was laid to clover, of which, it was computed, he mowed ſeven tons; after which he let the haygraſs for five guineas. Other years it has produced of boiling peaſe ten quarters; of barley twenty quarters; and of white oats twenty-five quarters: their meaſure nine gallons to the buſhel.

Mr. Stirling ſays, that although this ground has been ſown perpetually every year, except the one year above-mentioned, it has never been manured more than once. It had then a thin dunging for wheat; which grew ſo rank that it was of little value. At all other times the produce has been very great. The wheat and beans generally grow to upwards of ſix feet high. Mr. Stirling has it ploughed and ſowed by the neighbouring farmers, and ſeems not to have obſerved any particular mode of cultivation or courſe of cropping.

The ſoil is a blackiſh loam, from fourteen inches to three feet deep, on a ſtratum of ſandy ſtone, which the country people compare to fuller's earth. This ſtone falls to pieces in the air; but does not crackle in the fire, diſſolve in water, or efferveſce with vinegar. Mr. Stirling made an experiment ſeveral years ago, of planting beeches in the ſoil alone, and others in the ſtratum alone without any ſoil, which laſt flouriſhed much, and outgrew the other.

Whether this account may prove of any real utility, by inducing ſome curious ſpeculatiſt to ſearch nicely into the component parts of this fertile ſoil, you will beſt judge.

I am, your very humble ſervant,

BENJAMIN PRYCE.

Mr. Edmund Rack.

Article III.

Anſwer to Queſtions reſpecting Vegetation.

Sir, *Mancheſter, June* 21, 1782.

I Shall eſteem myſelf happy if any thing I have to ſubmit to your conſideration, in anſwer to your queſtions reſpecting vegetation, can afford you any ſatisfaction on that intereſting ſubject.

1*ſt*. Suppoſing the opinion to be true, which almoſt univerſally prevails, that arable land, after having borne a few crops, muſt remain ſome time *fallow* before it is fit to produce the ſame courſe of crops again: Whence proceeds the neceſſity of ſuch fallowing?

2*dly*. Does the earth by the growth of vegetables loſe any particles neceſſary for future vegetation?

I ſtate theſe two queſtions together, becauſe the conſideration of the ſecond ſeems properly to be previous to the firſt.

That the earth, by the growth of vegetables, is exhauſted of thoſe principles which are neceſſary to future vegetation, is abundantly manifeſt from the univerſal experience of mankind. All ſoils become weaker and poorer in proportion to the crops they have borne. This is not a matter of mere opinion, for the moſt fertile ſoils have and may be made unfertile by conſtant cropping, and the practice of all ages and countries fully evince the ſame: Therefore the true anſwer to this queſtion is, that vegetables do take from the earth they grow in the particles neceſſary to vegetation, and conſequently a temporary barrenneſs may be induced by over or a too long continued cropping.

But though it is certain, that rich or fertile land may be rendered unfertile or barren by extravagant and unreaſonable cropping; it does not follow that fallowing is abſolutely neceſſary to reſtore its fertility, becauſe the ſame end may be as effectually anſwered by other means; Fallowing may be neceſſary to clean the ground, and deſtroy the weeds which ſloth or bad huſbandry may have occaſioned, and which perhaps could not be eaſily extirpated by any other means; but it cannot be neceſſary to reſtore fertility, unleſs in ſuch ſituations as proper manure cannot be obtained but at prices too exorbitant for the produce to repay with profit. Arable land may be ſo ſituated and circumſtanced as to admit of no amendment from manures; as when they are far

diſtant

diſtant from towns, and deſtitute of marle, limeſtone, chalk, and every thing that is known from practice to renovate the fertility of exhauſted and impoveriſhed land. Here then the only reſource is *fallowing*, and the neceſſity of it proceeds, firſt, from the principles or particles neceſſary to the growth of vegetables being exhauſted by preceding crops; and ſecondly, by the want of manures neceſſary to reſtore and repleniſh the ſoil with thoſe principles which the preceding crops had deprived it of and carried off.

Here, indeed, a very intereſting and important queſtion may ariſe:—How, or by what means, can land lying fallow or unoccupied, have thoſe particles neceſſary to fertility reſtored? That fallowing has this beneficial effect cannot be denied, becauſe all experience bears indiſputable evidence to the truth of it. The effect is univerſally admitted, but the cauſe is the great *deſideratum*. It muſt be obſerved, it is not mere reſt that enriches and invigorates an exhauſted ſoil. Its improvement, in general, will be in proportion to the *culture* beſtowed upon it. This was fully evinced by the ingenious Mr. Tull, who clearly demonſtrated by facts the great benefit of pulverization. But though his practice was right, as it certainly promoted the fertility of his land, the principles he drew from it were as certainly wrong. He maintained that pulverization increaſed the paſture of plants, and furniſhed their proper pabulum; and concluded earth in its moſt ſubtilized ſtate was the true food of plants. In this he certainly erred. He miſtook the means neceſſary to the acquiſition of fertilizing particles, for the fertilizing particles themſelves. Pulverization certainly increaſes the paſture, as the roots of plants eaſily pervade the earth in every direction, as its adheſion is diminiſhed or deſtroyed, and as it renders the ſoil pervious to the fertilizing particles which are continually floating in the atmoſphere. The atmoſphere is the great repoſitory, the grand magazine, which contains the fertilizing principles, and it is from that great and inexhauſtible ſource that all the benefit of fallowing is derived. But pulverization is abſolutely neceſſary to prepare the ſoil for the reception of thoſe particles; for earth in its natural compact ſtate admits neither rain, ſnow, dew, nor any of thoſe finer and more ſubtilized particles which are continually floating in the air, deſcend with them to the earth, and are carried off in the ſtreams they form on the ſurface, together with ſuch other particles as they take up and arreſt in their way. So that rain, ſnow, dews, &c. which ſink into, and are imbibed by a well-cultivated ſoil, and enrich the ſame, rather impoveriſh a compact ſoil, by carrying off thoſe adventitious particles it may happen to have on its ſurface, together with thoſe that deſcend with them from the atmoſphere. That is, land well cultivated and pulverized is conſtantly enriched and improved by the weather, while that which is neglected not only receives no benefit from the atmoſphere, but is liable to have what little chance has beſtowed upon it waſhed away by haſty ſhowers and heavy rain, which cannot penetrate the obdurate ſurface.

The concluſion then is, *Firſt*, That the earth is deprived of certain particles neceſſary to vegetation by the growth of plants; and to reſtore its fertility, it is neceſſary that ſuch particles ſhould be reſtored. *Secondly*; Thoſe particles may be reſtored either by the addition of proper manures, or, in ſituations where ſuch manures cannot be had, by a due pulverization of the ſoil, and expoſing it to the influence of the atmoſphere, that is to ſay, by *fallowing*. *Thirdly*; that arable land after having borne a few crops need not remain ſome time fallow before it can produce the ſame crops again, unleſs in circumſtances where manure is not to be got: for whenever the earth can be repleniſhed with ſuch fertilizing particles without fallowing, in that caſe fallowing is evidently unneceſſary.

Queſtion 3d. What are thoſe particles that are neceſſary to vegetation?

The purport of this queſtion I underſtand to be, Of what nature or conſtitution are thoſe particles which enter into the eſſence of plants, aſſimilate with it, and increaſe their bulk; or, in other words, which feed and ſupport plants in every ſtage of their growth, from their firſt embrio ſtate to that of maturity, or higheſt ſtate of perfection?

For a rational ſolution to this queſtion we muſt have recourſe to experience. Indeed no certain concluſion can be drawn in the extenſive field of agriculture, from data furniſhed by any other means. All theories and hypotheſis, whoſe principles originate in the imagination, are as viſionary, deluſive, and untenable, as aerial caſtles, whoſe foundations are in the clouds. A man may think ingeniouſly, but he will rarely think rightly, when he quits the ſure guide of experience to purſue the flights of a glowing fancy, which has no connection with or relation to the eſtabliſhed laws of nature.

The daily practice of every huſbandman clearly ſhews, that thoſe fertilizing particles, of whatever they conſiſt, are to be found in every article of the vegetable and animal kingdom, that is capable of fermentation, and diſſolution by putrefaction. The dung-heap, which is a promiſcuous combination of theſe ſubſtances, when in the higheſt ſtate of putreſcence, is perhaps the ſtrongeſt and moſt efficacious of any general manure. Were this to be had in quantities equal to the farmer's wiſhes, at a moderate price, his fields might be always fertile, as it would be a fund ſufficient to reſtore thoſe principles of vegetation which the moſt exhauſting crops could annually take from the ſoil. It is a matter perfectly unintereſting to the practical farmer, by what name the philoſophical chymiſt may call thoſe fertilizing principles. They may be oils, ſalt, ſulphur, water, earth, ſome or all combined together. The knowledge of this is of no importance to him. He is a ſtranger indeed to chymical analization, but he is perfectly acquainted with the groſs ſubſtance, in which thoſe particles ſo neceſſary to reſtore fertility to his exhauſted fields are to be found; and experience has taught him the beſt ſeaſon, and moſt beneficial method, of applying them for the benefit of his crops. Could the farmer procure a ſufficient quantity of this manure, a fallow to reſtore the particles neceſſary to vegetation would be unneceſſary; the land might be repleniſhed as faſt as the moſt exhauſting crops could weaken it, and in this way the land, inſtead of being impoveriſhed, would be improved, and the longer it was kept in culture the richer and better it would grow, as is evidently the caſe of all land that is cropped and cultivated with diſcretion.

This may be called the natural means of providing the pabulum or food of plants, as properly as giving graſs to a cow, or hay to a horſe. But there are other means of improving of ſoils, which communicate none of theſe particles which are neceſſary to the ſupport and growth of plants. This is done by means purely mechanical, by rendering ſome ſoils more ſuſceptible of thoſe fertilizing particles which float in the atmoſphere; and others more capable of retaining them during the ſtage of the growth of plants in them, than they were in their natural ſtate. Thus a very ſtrong adheſive ſoil, which in its natural ſtate may be too compact for moſt ſorts of vegetables to thrive in, by the proper admixture of gravel or ſand, its ſtaple may be ſo ſhortened and opened as to favour the admiſſion of atmoſpherical particles, and to encourage the extenſion of the roots and tender fibres of the plants that may grow in them. And a ſoil which conſiſts chiefly of gravel or ſand may, by a proper addition of clay, chalk, marle, or any binding earth, be made capable of retaining thoſe particles neceſſary to vegetation, which would otherwiſe paſs through them like ſand through a ſieve, and conſequently would be beſtowed on them in vain.

Lime, I apprehend, conſidered as a manure, is *chiefly* to be regarded for its mechanical properties; for neither in its quick or effete ſtate doth it contain any of thoſe nutritive particles neceſſary to the growth and increaſe of bulk in plants. Indeed, when judiciouſly uſed, it may as an alkali ſerve to unite and combine the oils it may happen to meet with in the ſoil with aqueous or humid particles, for it ſtrongly attracts both, and forms a kind of ſaponaceous mixture highly replete with fertilizing particles. But the various methods uſed in manuring with lime plainly ſhew the farmers in general act upon no certain or fixed principle, but conduct their practice by the cuſtom and uſage of the country, without being able to aſſign any reaſonable ground for their expectations of a crop, otherwiſe than a ſettled belief that their land would be unproductive without it; while others are free to declare, that they could never perceive that they derived the leaſt advantage from it.

Lime in ſome ſtates, and under ſome circumſtances, is ſo very different a thing from lime in other ſtates, and under other circumſtances, that unleſs its condition be pretty accurately deſcribed, it is ſcarcely poſſible to treat intelligibly about it. There are ſcarce any two bodies which differ more in their properties, than the properties of quick lime do from thoſe of effete lime; therefore, to aſſert any thing of the virtue of lime, either as a medicine or a manure, without deſcribing its ſtate and condition, and the circumſtances of uſing it, is to ſay nothing that is intelligible, or that can convey the leaſt beneficial information. The ſubject, however, is worthy of the moſt thorough inveſtigation, though it appears to have been very little attended to by the practical farmer or philoſophical experimenter. With ſome, it is the *ſine qua non* of ſucceſsful practice; with others, a certain heavy expence attended with no kind of advantage. Where its greateſt effects are ſaid to have been experienced, I believe it is more owing to a fortunate concurrence of circumſtances than to the ſkill of the huſbandman, acting upon principles deduced from the reaſon and nature of the thing.

However, as in many counties it is the farmer's chief, almoſt only dependance, and attended with a heavy expence, it is ſurely of great moment, that its principles of acting ſhould be better underſtood, and its virtue more ſatisfactorily aſcertained; which, if leiſure permits, may be attempted in ſome future paper.

If you think theſe remarks worthy of the notice of your reſpectable ſociety, I beg you will preſent them with my reſpectful compliments.

I am, Sir,

With much reſpect and eſteem,

Your moſt humble ſervant,

JOSEPH WIMPEY.

Mr. Edmund Rack.

ARTICLE IV.

A Supplement to the Anſwer ſent to the Secretary of the Bath Society, reſpecting Vegetation, &c.

And read before the Literary and Philoſophical Society of Mancheſter, the 3d of July 1782.

[By Mr. JOSEPH WIMPEY.]

AS truth and uſefulneſs are the ultimate objects of philoſophical enquiry, the writer of the anſwer preſumes to hope, the candid ſociety will indulge him with an opportunity of endeavouring to obviate the objections made to it, that appear to him to be groundleſs.

Queſtion. " If arable land, after having borne " a few crops, muſt remain ſometime *fallow* be" fore it is fit to produce the ſame courſe of " crops again; whence proceeds the neceſſity of " ſuch fallowing? Does the earth, by the growth " of vegetables, loſe any particles neceſſary for " future vegetation, &c.?"

To this it was anſwered:—" That the earth, by " the growth of vegetables, does loſe certain par" ticles neceſſary for future vegetation, is a fact

" well known to every practical huſbandman;
" for there is no land, though it may be ever ſo
" fertile, but by conſtant cropping may be ex-
" hauſted, and reduced to a ſtate of barrenneſs.
" But it does not follow, that fallowing is *abſo-
" lutely* neceſſary to reſtore its fertility, becauſe
" where a ſufficient quantity of manure can be
" obtained, its fertility may be reſtored without
" fallowing. And on this ſcale of management,
" the longer land may be under cultivation, it
" would be ſo far from being impoveriſhed by it,
" that it would be in a conſtant ſtate of progreſſive
" improvement."

To this it was objected, by a very reſpectable and ingenious member preſent, (the Rev. Mr. Hall) that the opinion was not well founded, for he had known inſtances wherein fertility could not be reſtored by manure, and mentioned ſome garden or gardens within his own knowledge. To this the writer replies, the objection ſuppoſes what the poſition does not aſſert or maintain. Had it been aſſerted, that the fertility of land increaſeth in proportion to the quantity of manure laid upon it, the objection might have been good; but he knows little of vegetation, or of the improvement of land, who knows not that it may be rendered unfertile, at leaſt for a time, by laying too large a quantity of dung upon it; and perhaps of the two evils, a ſurfeit may be more pernicious than a faſt.

Should it be aſſerted, that animal food and vinous liquors give nouriſhment and ſtrength to human bodies; the objection would be deemed frivolous, which ſhould aſſert that inſtances frequently happen of their cauſing ſickneſs and ſurfeits, and becoming loathſome to the ſtomach. This would be no argument againſt the truth of the poſition; but a very juſt one, that the beſt things may be abuſed, and their value deſtroyed by a prepoſterous uſe of them.

A gentleman's gardener keeps no account of profit and loſs for his maſter. His intereſt often depends upon the goodneſs of his crops, and his credit always upon the magnitude and beauty of his fruit, &c. but it is no object with him, whether a cucumber or a pound of potatoes ſtand his maſter in five farthings or five ſhillings, or whether a melon or a pine-apple coſt him a penny or a pound. His ambition is to excel. The pleaſure of making computations, and the advantages attending them, he ſagaciouſly leaves to thoſe whom it may more nearly concern. However, ſhould we enquire into the foundation and ſupport of his art, it would appear that his principal dependance is upon manure, for till his ſoil is rendered fertile, his art and his labour would be fruitleſs and vain. Surely it is no argument, that proper manure will not reſtore fertility to an exhauſted and debilitated ſoil, becauſe it will not produce ſimilar effects in thoſe which have been already drenched and ſurfeited with too much. A gardener is generally profuſe in the uſe of dung, as long as he finds it will force his crops; but the time will come, when by this means the ſoil will become ſo rich, light, and porous, that it would bear nothing but a muſhroom or a fungus, a pompion or a gourd.

The products of nature and of art have each their *ne plus ultra*, and the efforts of the latter are univerſally circumſcribed by the former; and perhaps there is no article in either, which under different circumſtances, as quantity may be proportioned, may not be a medicine or a poiſon. And this, it is preſumed, will ever hold true both in the animal and vegetable kingdoms.

Every one knows the upper ſtratum of mould, which is found on the ſurface of all fertile ſoils, is that in which fertility chiefly reſides, and it is equally certain, that the more conſtantly land is under cultivation, this upper ſtratum will be proportionably increaſed by the more frequent addition of manure, and the roots and ſtems of the plants that grow in and upon the ſame; and therefore, as was ſaid, conſtant culture improves and not impoveriſhes land, as its fertility is generally, perhaps it may with truth be ſaid always, in proportion to the depth of this adventitious ſtratum; for it is by no means an original or primitive earth, but a combination of vegetable and animal matter, or of one of them ſeparately, produced by putrefaction and diſſolution, which being by culture intimately blended with the original ſoil, perhaps ſand, or gravel, &c. of themſelves barren, a fertile ſoil is at length procured with increaſing powers, as cultivation is multiplied and extended.

The practice of the kitchen gardeners, near the metropolis, and in the vicinity of moſt market towns, will at once illuſtrate and confirm the doctrine here advanced. They frequently raiſe three or four crops annually on the ſame ground, and ſupport ſuch an extraordinary exhauſtion ſolely by culture and manure. The rent of their land is too high to admit of fallowing, and the goodneſs of their crops plainly ſhews it does not ſtand in need of it. Labour and dung anſwer

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every purpoſe. And I have been informed, much of their land, which was not worth more than 20s. an acre twelve or fourteen years ago, is now worth, at leaſt, half ſo many pounds:—So much has it been improved by the culture and manure beſtowed upon it, without the leaſt advantage from fallowing.

As to the electric property of plants, mentioned by one of the members, how much ſo ever its theory may have been ſupported by men of learning and ingenuity, it has been long reprobated as viſionary and chimerical by practical huſbandmen, it being repugnant to, and contradicted by daily experience.

Let a fertile ſoil continue to be planted with any one kind of grain whatever, 'till its ſtrength be exhauſted, and no longer capable of bearing that particular grain, it will be found equally incapable of producing a crop of any other kind which requires an equal degree of ſuſtenance. Should a fertile field be ſown firſt with wheat, then with barley, then with oats, and then with rye, it would be found ſuch field would bear neither turnips nor clover, 'till its fertility was reſtored either by manure or by fallowing. And ſhould it be planted with wheat or barley *only*, ſeveral years in ſucceſſion, 'till its ſtrength was exhauſted, it would be equally incapable of bearing any other ſort of grain, roots, or graſſes, as if it had borne each in ſucceſſion according to the uſual courſe of cropping; which ſhews that the fertility of land may be as completely exhauſted by any one plant as by them all, which could not poſſibly happen, if the particles of nouriſhment each drew were only proper to each, and could not be abſorbed by any other.

It is true, ſome kinds of plants exhauſt and impoveriſh the ſoil much faſter than others; as perhaps three crops of wheat would impoveriſh the land it grew on, as much or more than four of barley; but yet, if planted with either 'till it would bear no longer, it would be found equally incompetent to the growth of every other kind of plant, excepting ſuch unprofitable ones as are the natural produce of ſterile ſoils.

The true concluſion therefore is, if land be exhauſted, whether by the growth of one particular kind of plant, or of many kinds in ſucceſſion, its fertility muſt be reſtored before it can bear a profitable crop of any other kind of vegetable, though it had not been planted with it for an age before.

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The queſtion ends with aſking, "Does the "earth attract any thing inimical to vegetation? "And if ſo, what is it?

That ſome earths may be more favourable to vegetation than others, and that ſome may be impregnated with ſteely or other poiſonous matter that may be inimical to vegetation, is very eaſy to conceive; but that a ſoil, in itſelf fertile, ſhould attract any thing from the plants that grow in it, that is inimical to future vegetation, I cannot conceive.

It is true, a very learned and ingenious member (Dr. Percival) ſeemed to doubt, if I underſtood him right, whether the earth might not attract ſomething from the plants growing in it that might be prejudicial to it; for, ſaid he, reaſoning by analogy, why is it not probable, that vegetables in this reſpect may ſuffer like animals? For my own part, I muſt acknowledge, I do not know that either the one or the other are ſubject to any thing, during the different ſtages of their growth, that militates with or is inimical to their own well-being.

Nor can I conceive what the obſervation means, unleſs it be, that the reſpiration and perſpiration of animal bodies, when collected in a confined or very cloſe place, where little or no freſh air can gain admittance, form a putrid atmoſphere too noxious and deadly for animals to ſubſiſt in. In this ſenſe, indeed, vegetables may ſuffer equally; for freſh air is as neceſſary to ſupport vegetable as animal life, one being as incapable of ſubſiſting without it as the other. But theſe evils reſult from accidental circumſtances, and not from any fixed law of nature, the wiſeſt proviſion having been made for clearing the air of noxious effluvia, and ſupplying it univerſally with neceſſary vivifying principles.

According to ſome late diſcoveries in natural philoſophy, the œconomy of nature, in this reſpect, is tranſcendently beautiful and aſtoniſhing; for thoſe excrementitious vapours that would ſoon render the air putrid and poiſonous, are quickly abſorbed by the vegetable kingdom, and the air purified and made fit for reſpiration.

The animal and vegetable kingdoms ſeem to be the mutual ſupport of each other, with this difference only; the latter is abſolutely neceſſary to the ſupport of the former, but the former not to the latter, it having a reſource within itſelf, and can ſubſiſt without it, though evidently not to equal advantage. Thus vegetables are the immediate food of thoſe animals which entirely ſubſiſt upon them, and mediately of the carnivorous race by the ſupport of thoſe they live upon.

But though the vegetable kingdom is in a great meaſure ſuſtained by the animal, I mean thoſe raiſed on lands in high cultivation, yet for the moſt part they might be ſuſtained by feeding on their own ſtock; for vegetables, thoroughly reduced by putrifaction and diſſolution, become the proper pabulum and ſupport of a new generation of vegetables, but this is by no means the caſe in reſpect to animals.

Analogy here then ſeems to afford no foundation for the opinion, that the earth may attract ſomething from the preſent growth of vegetables inimical to the growth of thoſe which may ſucceed them. Indeed the ſuppoſition involves a contradiction; for it is within the compaſs of every one's knowledge, that land is frequently planted with ſome kinds of vegetables, to be ploughed in by way of manure to promote the growth and ſecure a profitable crop of others. Thus buckwheat, rye, clover, and ſometimes the green of turnips, &c. are ploughed in to manure and prepare the land for wheat, and perhaps, in many caſes and ſituations, it is the cheapeſt and moſt profitable of all manures whatever; but if, as the ſuppoſition ſtates, the earth, during the growth of the preſent, contracts any diſorder that may prove inimical to the ſucceeding crop, the practice could not produce the expected benefit, but muſt prove univerſally detrimental, which is contrary to all experience.

The plain truth then ſeems to be this:—All fertile ſoils contain particles neceſſary to the growth of vegetables.—All vegetables in their growth neceſſarily take from the earth as many of thoſe particles as are uſeful to their growth and ſupport; by which means the moſt fertile ſoil will in time become poor, that is to ſay, when it is exhauſted, or nearly exhauſted, of ſuch neceſſary particles. But theſe neceſſary particles may be ſupplied, and fertility reſtored, by the growth of more vegetables, provided the crop be not taken off from the land it grew on, but ſuffered to remain upon it, or rather at a proper ſtage of its growth ploughed into it. This clearly proves then, that the earth does not *attract any thing inimical* to vegetation during the growth of plants, but that it is truly enriched and improved by their growth, if they are ſuffered to remain there. After all, an inquiſitive mind may find ſomething very ſurpriſing in an enquiry concerning the nouriſhment and growth of vegetables, and perhaps much more ſo in reſpect to animals.

Every one knows, that all richly cultivated lands, whether fields or gardens, are made fertile by manure; and that the richeſt of all manures are thoſe ſubſtances, whether animal or vegetable, which have paſſed through the bodies of animals. The excrements of animals then are the richeſt and moſt nouriſhing food of vegetables; therefore it is very reaſonable to ſuppoſe, and experience confirms it, that they attract them copiouſly in their ſubtilized ſtate as they float in the air. But is it not truly aſtoniſhing, that materials, the moſt offenſive and diſguſting one can conceive, ſhould, by the wonderful chemiſtry of nature, be converted into plants, leaves and flowers, moſt curiouſly beautiful, which charm, delight, and raviſh the taſte, the ſight, and the ſmell?

Should we carry our ſpeculations a little further, our aſtoniſhment will be greatly increaſed. Of what does the nouriſhment of man conſiſt? From what ſource are his moſt favourite viands derived? Is it not eaſy to conceive, or rather, is it poſſible not to perceive, that a few months before they might exiſt under a form and in circumſtances the moſt loathſome and offenſive. Excrements the moſt groſs and deteſted may ſoon aſſume the pleaſing verdure of a richly enamelled field, be devoured by the bleating flock, and conveyed a ſecond, yea, a tenth time into the ſame ſtomach and bowels in the form and ſubſtance of the fleſh of an innocent lamb. What a mortifying conſideration this to the pride of a prince, who can never be certain that the laſt meal he made was not, and the next will not be, on the excrements of a beggar; or, what is ſtill infinitely worſe and more diſguſting, on the putrid remains of a polluted nymph, who made her laſt groans in the horrid manſions of the Lock!

ARTICLE V.

TO THE SECRETARY.

SIR, *Cavendiſh-Square, April* 6, 1782.

ON my ſhewing you Mr. Anderdon's anſwers to ſome queries I had put to him, you expreſſed a deſire to have them, that they might be inſerted in the ſecond volume publiſhed by the ſociety. I wrote to him for his approbation of your propoſal, and incloſe you his anſwer; and I make no doubt but you will comply with the terms* he requires. I have ſent you a fair copy of them for that purpoſe.

I have introduced the Norfolk plough, with great ſucceſs, into our part of Wiltſhire, making ſome ſmall alterations therein; ſo that I now only uſe two horſes where I formerly uſed four; it will ſoon become univerſal amongſt us.

I am, your's ſincerely,

W. L. JONES.

QUERIES *propoſed by Sir William Langham Jones, Bart. to Robert Proctor Anderdon, Eſq; with Mr. Anderdon's Anſwers.*

1ſt. AT how much an acre does the adjacent land of the ſame quality let?

2dly. Are the ſtones much, or any, impediment to the ſucceſs of the experiments?

3dly. Does Mr. Anderdon think that the ſame advantages might be expected from the horſe-hoeing huſbandry when tried on flinty ground, as from his ſtoney land?

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* Theſe terms were, that Mr. Anderdon ſhould have the reviſal of his anſwers previous to their publication, which have been complied with.

4thly. At what diſtance are his rows of wheat, and alſo the plants in each row?

5thly. Is the ſame row planted every ſecond or every third year?

6thly. Does he manure the ground? If ſo, how often, and what is the manure he uſes; and how often in the year is the fallow ploughed?

7thly. How many years has the wheat-field been under this courſe of huſbandry?

8thly. Does the ſaid field become more fertile according to Mr. Tull's principles, though no manure is put upon it; or does Mr. Anderdon think that it is worſted by ſuch a mode of cropping it?

9thly. What may be the produce of an acre thus tilled? And how much more does he think it would produce, if cropped according to the common mode of huſbandry?

10thly. If he thinks the berry [kernel] better and heavier, and ſo liable to ſmut or blight, as if the land were tilled in the uſual manner?

11*thly*. Whether, on the whole, he has reaſon to prefer this new to the old mode of huſbandry, and whether he thinks any conſiderable tracts of land could be managed upon the principles of the new huſbandry?

12*thly*. With reſpect to Mr. Anderdon's experiments on graſſes, Which does he think will be the beſt to feed ſheep with; and how many more will an acre of ſuch graſs maintain, than it would if in meadow, and cut and given to them to eat?

13*thly*. What graſs does he think beſt for cows, and what for horſes? And whether on the whole, conſidering the difference of the expence, it is an object to turn good meadow or paſture ground into ſuch a mode of cultivation?

14*thly*. Whoſe ploughs, &c. does Mr. Anderdon uſe; and what authors does he recommend to any deſirous to try the horſe-hoeing and drill huſbandry?

ANSWERS.

1*ſt*. FROM five ſhillings to twelve ſhillings per acre.

2dly. The ſtones in Mr. Anderſon's lands are calcarious; and he has an idea (but muſt leave it to chymiſts and philoſophers to decide upon the fact) that their effervefcence, on the change of weather, contributes to the fermentation neceſſary to vegetation.

3dly. Mr. A. has had no experience himſelf on flinty land; but unleſs the ſtones are ſo large as to obſtruct the operation of the plough and horſe-hoe, he thinks ſuch lands well adapted to the horſe-hoeing huſbandry, the looſe ſtones, at leaſt, aſſiſting to keep them in a more conſtantly ploughable ſtate, (which is abſolutely neceſſary to ſucceed in that mode) and moſt probably alſo aſſiſting vegetation, in the manner ſuppoſed from the lime-ſtone, or otherwiſe.

4thly. He drills two rows, a foot aſunder, on a ridge five feet wide, of courſe leaving intervals of four feet for horſe-hoeing. The ſeed is ſhed in the rows promiſcuouſly, but regularly, by Willy's drill-plough, at the rate of from two pecks to a buſhel per acre; and he is of opinion, that the medium between the two is preferable to either extreme, if the land be well tilled, and the ſeed ſown in proper ſeaſon, having due time for the plants to tiller.

5thly. The wheat is drilled on the ſame ground every ſecond year; and Mr. A. continued that mode to advantage eleven ſucceſſive years, in the ground above alluded to; his tenth crop producing eighteen buſhels an acre, and his eleventh crop ſixteen buſhels per acre, after great devaſtation from mice, the crop remaining in the mow almoſt two years.

6thly. He manured the ground for the firſt crop with twelve hogſheads of lime per acre, and eight putt or cart loads, of this country, of rotten dung, to three acres and a quarter, at the expence of 20s. 4d. per acre. For the ſixth crop he manured again with twenty hogſheads of lime an acre, mixed with forehead-earth* and the rubbiſh of an old lime-kiln, at the expence of 1l. 19s. an acre: And he uſed no other manure for eleven crops, except about twenty loads of earth and rubbiſh at another time, on a ſmall portion of the field where the natural ſoil was remarkably thin, which, if charged to the whole field, would not be 2s. per acre at the utmoſt: the whole expence of manure for the eleven years amounting to nearly 5s. 7d. per acre per annum.

Mr. A. has ſometimes ploughed or horſehoed his alleys only twice during the growth of his crop, but it ſhould be repeated three or four times at leaſt; the earth cannot be kept in too friable a ſtate. When the crop is in early enough, and the weather will permit, (as this year 1781) he has ploughed or horſe-hoed before Chriſtmas; then he ploughs again as early as he can in the ſpring; a third time when the ear begins to ſwell in the ſtem; and a fourth time immediately before the bloſſom is come out, or as ſoon as it is gone: And theſe four ploughings, or horſe-hoeings, he thinks abſolutely neceſſary to do juſtice to that mode of huſbandry, yet is ſorry to ſay, to his loſs, he has ſeldom fully complied with them.

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* Head-lands digged up.

7thly. Eleven years, as above; the laſt crop was reaped in autumn 1779.

8thly. Mr. A. finds his ground, with the manure as above-mentioned, greatly improved, and is of opinion, that, after the above mode of cropping for eleven years, had he carried no manure on the ground, it would have been rendered more fertile than at the beginning; but he does not think he ſhould, in ſuch a caſe, have had crops ſo profitable as with manure; yet he thinks it abſolutely neceſſary to avoid manuring ſuperabundantly for wheat crops, leſt they ſhould run to ſtraw, and thereby become unprofitable.

9thly. The

9thly. The crops have been from nineteen buſhels to nine per acre: the average of the eleven crops fourteen buſhels per acre per annum. The crops of wheat in the ſame pariſh, take the good ground with the bad, (and ſome runs to a pound an acre) for the eleven years in queſtion, Mr A. has been well informed, were on an average not more than fifteen buſhels an acre. It ſhould be obſerved, by the drill mode, you have the advantage of ſaving a buſhel or more of ſeed per acre, as well as of having a wheat crop every year, and keeping your ground clean and in good heart.

N. B. When the crop was only nine buſhels an acre, it happened from ſteeping the ſeed according to Reynolds's method, which was overdone, by which means two buſhels were increaſed to three, and a very wet ſeaſon following, the ſeed was in great part burſt and deſtroyed.

10thly. The berry or grain is certainly larger, fuller, and more perfect, conſequently heavier in every ſenſe.*

As the ſmut has not affected Mr. Anderdon's crops, and attacks chiefly weak corn, and as you may in this mode of huſbandry ſow ſoon after harveſt, and horſe-hoe almoſt at pleaſure; he thinks it moſt likely to contribute to its prevention, removal, or cure. Change of ſeed, and brining it, are alſo recommended to prevent it.

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* This perfectly agrees with the accounts from Norfolk of the wheat crops that have been *ſet* in that county.

For the blight, as there are ſeveral ſorts, ariſing for the moſt part from poverty, all ſuch Mr. A. ſuppoſes the horſe-hoe might remedy; but as to that ſpecies which ariſes from plenitude, he ſuppoſes this huſbandry muſt be, in a degree, liable to, as well as the old; yet he thinks frequent horſe-hoeings, as they retard the immediate growth and haſtily running up of the plant, would in the progreſs, if repeated with judgement, ſtrengthen the ſtem, and abate, if not prevent, that weakening and falling of it, which might otherwiſe occur from repletion and haſty growth.

His corn has been ſlightly attacked by the ruſt or mildew, but never yet ſo powerfully as his neighbours in general at the ſame time.

11*thly*. Mr. A. thinks the drill plough, judiciouſly uſed, a very great acquiſition to agriculture. He is of opinion, from experience, that the uſe of it is the beſt method, not only for putting in wheat ſeed in the horſe-hoeing or Tullian method, but alſo when the whole field is ſeeded with that grain, ſowing it in ſuch caſe in equidiſtant rows, nine or ten inches or a foot aſunder. In that way, it is beſt too for ſeeding ground with barley, oats, or vetches. The ſeed will be leſs, the crops more certain and larger. It is alſo beſt for putting in turnip ſeed, and horſe (or tick) beans, both of which he would recommend to be ſown in ſingle rows, three feet aſunder, horſe-hoeing the intervals; peaſe may be better ſupported in double rows, a foot aſunder, on five-feet ridges.

Succeſſive horſe-hoed crops of wheat are profitable; but he is rather inclined to think the horſe-hoeing huſbandry would be moſt profitably carried on by a change of crops; and that turnips on a good fallow, drilled in ſingle rows, three feet aſunder or more, 'till the ground is in perfect tilth, would be a good crop to begin with; and if dung or other manures can be had, they can ſcarcely, for that crop, be too plentifully applied; but on reclaiming large extents of land, muſt in great meaſure be diſpenſed with. Then ſhould follow ſuch drilled crops as beſt ſuit the ſoil and ſituation, and the farmer's occaſions, whether according to the Tullian mode, or in equidiſtant rows; and ſhould it be barley or oats, in the latter way, it will be remarkably favourable to the graſs ſeeds, if any are ſown with them. But a great reſpect and conſideration ought always to be had in favour of the Tullian mode, from the vaſt advantage ariſing from the ground being clean of weeds, which advances in proportion to the length of time the ground has been well managed under that mode, and not been made foul by carrying into it the ſeed of weeds with dung or other manure: Therefore Mr. A. ſtrongly recommends it to the farmer, whoſe ground is well adapted to wheat crops, to introduce them in the courſe of crops in the Tullian mode, and to take two, three, or four ſucceſſive crops, which may as well be taken as one.

Mr. A. is of opinion, there are in England millions of acres of land uncultivated, and badly cultivated, that would admit of being greatly improved upon the principles of the New Huſbandry, not too haſtily or inconſiderately exerciſed. It always, in the firſt place, requires a fallow and perfect tilth; if very foul and rough, it ſhould have two years fallow before it is cropped; and if very poor, it will require and pay amply for ſome manure, if attainable. But the plough and manure may often be too much for corn crops; and it is abſolutely neceſſary to ſuit

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your crops to the nature of your ſoil, and the ſtate it is in. He imputes the ſmall progreſs the drill-plough has made in agriculture to the want of attention to thoſe particulars, ariſing chiefly from the adventurer's being too ſanguine and haſty to execute his new project, and actually doing it before his ground is in order; of courſe the crop fails, and the drill-plough is no more heard of.

12*thly.* Mr. A. is not acquainted with any graſs fit to cut and give to ſheep in preference to their feeding on the ground allotted out to them in parcels by hurdles, where convenient or neceſſary; for which purpoſe he knows no artificial graſs ſuperior to meadow. If lucerne or ſainfoin were cut and carried to them, they would eat the leaves and not the ſtem. But Mr. A. thinks Burnet ſo healthy a graſs for ſheep, that he earneſtly recommends it to all farmers to interſperſe ſome of it in every field ſown with graſs ſeeds, to remain in paſture; for he conceives it to be warm and aſtringent, having put ſheep that have ſcoured into ſuch of his fields as abound with it, by which they have ſoon been viſibly benefited. At the ſame time Mr. A. as earneſtly diſſuades farmers from ſowing it alone, (unleſs to ſave their ſeed) becauſe he never found any cattle fond of it alone; but it paſſes very well in common with other graſſes.

13*thly*. For horſes, cows, and all black cattle, to be cut and carried to them to eat, he thinks Lucerne preferable to any other graſs; and that an acre of it in good ground, where it thrives well, will, from early in May to Michaelmas, maintain twice the number of cattle that an acre of good meadow will. But the lucerne field is, in effect, a ſtubble from October to May.

Next to lucerne, for the above purpoſe, comes Sainfoin or French-graſs, but its produce in the ſummer is but little more than half as much as that of the lucerne; yet you may winter-feed the ſainfoin with ſheep 'till Chriſtmas, and with other cattle 'till Candlemas; but if you ſtock it later in the ſpring, you deſtroy your crop, the cattle eating the crown of the root and killing the plant.

But for the cultivation of theſe, or any other graſſes, by way of raiſing fodder for cattle, (or for any other purpoſes) Mr. A. has not an idea it would anſwer to deſtroy good meadow, or very good paſture, which, from Candlemas to May, (the ſcarceſt time of the year) is the moſt valuable of all, and ought to be held in the higheſt eſtimation.*

14thly. He uſes the patent plough for general ploughing, and often in the intervals of his drilled crops, but more frequently there leſſer ploughs, nearly on the ſame principle, ſometimes with, ſometimes without a mould-board, according to the ſtate of the ground and the crop;—the Kentiſh ſhim;—ſometimes Hewitt's horſe-hoe;—at others a kind of double cultivator or zull, with mould-boards extendible at pleaſure;—ſmall harrows for the intervals or alleys;—Willy's horſe drill-plough, which he has uſed fifteen or ſixteen years, without the expence of ſo many ſhillings to keep it in order. He alſo uſes a ſpiky roller to reduce his heavy clay lands, when perfectly dry only.

As to books, Mr. A. would recommend Tull's Eſſay on the principles of Vegetation and Tillage, to learn the principles of the New Huſbandry, which are very rational, and in general well explained by him; though his practice may probably be improveable by *ſome* change of crops, and *ſome* manure. He would alſo recommend Dr. Home's principles of Agriculture and Vegetation; Dr. Hunter's Georgical Eſſays; Randal's Semi-Virgilian Huſbandry; Young's Tours, and alſo his Experimental Agriculture; though he has been very unſucceſsful in his (juvenile) attempts, according to the Tullian mode, and differs from Mr. A's preſent opinion, in reſpect to the neceſſary quantities of ſeed-wheat, in which he thinks Tull, on a fair trial, well managed, on ground in the neceſſary perfection of tilth, would be found nearer the mark: Nor ought Dr. Harte's Eſſays on Huſbandry to be forgotten. But Mr. A. has preferred the ſowing of lucerne in rows, horſe-hoeing the intervals, to the Doctor's mode of planting, and finds it anſwer well. He alſo thinks Duhamel's and Chateauvieux's experiments in Geneva, and Wynne Baker's in Ireland under the direction of the Dublin Society, well worthy the attention of every pupil in the drill huſbandry.

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* As to the virtues of Burnet;—Mr. A's cows, in a dry ſummer when graſs was ſcarce in the meadows, were put into an old hilly paſture, where burnet grows naturally, in conſequence of which the cows produced an amazing increaſe of milk.

ARTICLE

ARTICLE VI.

On the Culture and Courſe of Crops proper for heavy Clay Lands, and which are beſt adapted to render Fallow unneceſſary.

[By an ESSEX FARMER.]

Mr. RACK,

THE courſe of crops beſt adapted to prevent the neceſſity of fallowing our heavy clayey lands is (with a little alteration) that you have mentioned in your laſt letter,* provided ſuch lands are rich enough to bear thoſe crops. It is certainly a principal part of good huſbandry to ſuit the land with an agreeable change or courſe of crops: but ſome of our ſtrong or ſtiff clay lands are ſo poor, that let the change be what it will, if we take more than two crops after a good fallow, it impoveriſhes the land to ſuch a degree, that a ſummer fallow will not reſtore it to its former ſtate. Experience has fully proved that ſuch farmers as take but one crop, to a good fallow, off ſuch lands, find it anſwer their purpoſe beſt. Many of our lands are ſo poor, that the ſecond crop does not pay the uſual expence, conſidering how much it hurts the next ſore crop.

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* See Courſe of Crops in following letter.

An experienced farmer knows his land, comparatively ſpeaking, as he knows his horſes. If his horſes are in good condition, and occaſion require it, they are able to go a double journey, if nothing unuſual befals them. In like manner we know our lands, if they are in good condition, and it pleaſes God to ſecond our endeavours with a ſuitable ſeaſon, will yield a good crop; but if we know that our land is not in condition to bear a good crop, we had better fallow it. There is no profit in a bad crop; for although it coſts little, it not only yields little, but leaves the land in worſe condition than it was before ſuch crop. I now occupy a field which yielded me eight good crops ſucceſſively in as many years; though before I took it, by being too often cropped, and by careleſs management, it became ſo foul as to produce only eight buſhels of wheat per acre. This change was effected by keeping it clean, by ſeaſonable ploughings, and a ſuitable courſe of crops. Firſt, I made a fallow, and manured it with dung. My courſe of crops were,

1. Turnips; 2. Barley; 3. Clover; 4. Wheat.

I then ploughed up the land, and gave it four dry tilths, with a ſowing tilth before I ſowed it in the ſpring. My fifth crop was oats; the ſixth, clover and rye-graſs; the ſeventh, peaſe; and the eighth, barley. But this land lies near a large town,[*] and had been mended with town-dung for many years. I ploughed it as deep as the ſoil would admit. The ſoil was a mixed one, conſiſting of clay and under loam; and part of it had a gravelly bottom, neither too dry nor too wet.

It appears to me, that in many inſtances, it is the ſuitable *mixture* of manures that makes the improvement, rather than any thing elſe we can account for.

We find the chalk and clay are as poor ſoils as any we know of: Yet I have found that by mixing theſe properly, and laying ſuitable quantities on as poor land as any in Eſſex, the land yielded as good a crop as any I ever ploughed. I am therefore of the opinion there might in the ſame manner be found a proper manure for our ſtiff clays; and when it is made rich enough, the courſe of crops you have mentioned would do very well.

I am trying experiments to find a proper mixture of manures for this purpoſe; and when I have ſatisfied myſelf, I will inform you what it is.

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[*] Bocking.

I have ſeen on our poor lands a courſe of crops that have anſwered as well as could be expected for ſuch ſoils. After a good fallow,

1 Barley,
2 Clover, fed all ſummer
3 Wheat
4 Vetches, fed all ſummer, or as long as there was feed.

Then, by ploughing, get it into good order for barley, and ſome for wheat; which, by this agreeable change, did beyond expectation.

I am, &c.

J. L.

ARTICLE VIII.

Extract of a Letter from Arthur Young, Eſq; to the Secretary.

Bradfield-Hall, Nov. 27, 1782.

Mr. RACK,

THE Turnip Huſbandry, wherever well introduced, has proved equal to the great object of the entire excluſion of the ſummer fallows, and is one leading ſtep to the ſetting them univerſally aſide.

I can eaſily conceive that, as Huſbandry improves in your counties, ſummer fallowing, oftener than common, will be eſteemed an improvement; and an improvement with which your farmers, like thoſe of Scotland, may ſet down contented.

But it ought to be a great object with the Bath Society, to attempt at once *perfect* huſbandry, which may poſſibly be as eaſily introduced as the other. This perfect huſbandry is to baniſh fallows from wet ſtrong lands, as turnips have baniſhed them from dry ones.

The only general crop that will effect this, is Beans. Suppoſe, therefore, the Society ſhould offer a premium for a courſe of crops to render ſummer fallowing unneceſſary on ſtrong lands, leaving the rotation of crops to the candidate; only ſpecifying the following as practiſed in different parts of the kingdom with great ſucceſs:

1 Beans	1 Beans	1 Cabbages
2 Wheat	2 Oats	2 Oats
3 Beans	3 Clover	3 Clover
4 Wheat	4 Wheat	4 Wheat
5 Beans	5 Beans	5 Beans
6 Wheat	6 Oats	6 Wheat

With reſpect to wheat, if the land be good, the mere article of leſſening the quantity of ſeed, ſo profuſely thrown away in the broadcaſt method, will increaſe the crop. But would not this effect ariſe from ſimply ſowing a leſs quantity, as it is much cheaper than ſetting by hand? Much more, might I aſk, would it not flow from Mr. Ducket's huſbandry? That of trenching (very ſhallow) clover leys, ſo as to admit his furrowing plough, and by that means drill as ſmall a portion as you pleaſe, at nine inches equidiſtant.

Till this experiment is made very accurately, I am only convinced, that the farmers hitherto have uſed too much ſeed, and that ſowing leſs is beneficial. The practice of ſetting by hand does not ſpread much here, but in Norfolk it does.

I am, with great regard,

Your moſt obedient ſervant,

ARTHUR YOUNG.

ARTICLE IX.

Account of a Crop of Potatoes raiſed in 1782.

[By a Gentleman Farmer in Wiltſhire.]

Mr. RACK,

IN compliance with your requeſt, I ſend you an account of the culture and produce of a field of potatoes laſt year.

The field was four acres and a half, the ſoil very poor, being light, looſe, and ſandy, not worth more than 10s. per acre; it had been laid down with graſs two years. In January, I carried on ten waggon loads of dung per acre; and the month following folded it over with my ſheep, and then ploughed it as deep as the ground would bear, and harrowed it ſmooth.

In March I planted my potatoes, 18 buſhels per acre: I had them cut in two, three, or four pieces, according to their ſize, and let them in with iron bars, in ranks two feet aſunder, and one foot diſtant in the ranks. They were of the large white kind, with large eyes, but I know not the name. Soon after they were up I had them hand-hoed, and a little while after horſe-hoed them. The horſe-hoe I uſed was ſo conſtructed as to earth them up at the ſame time, and performed the work ſo well, that I think it contributed greatly to the ſucceſs of the crop. Nothing more was done 'till the latter end of October, when I began taking them up.

The produce was four hundred and eighty buſhels per acre, or one hundred and ſixty ſacks. Any perſon bringing ſacks, and taking them on the ſpot, had them for four ſhillings per ſack.

The expences of ſeed, planting, cutting, hoeing, and taking up, were as follows per acre;

	£.	s.	d.
Eighteen buſhels planted per acre, at 2s. —	1	16	0
Cutting the ſaid 18 buſhels —— ——	0	6	0
Hand-hoeing 4s. horſe-hoeing 2s. per acre	0	6	0
Planting per acre —— ——	0	8	0
Expence of taking up per acre ——	2	8	0
Total	£.5	4	0
N. B. The expence of pitting and carrying home not included.			
Produce 160 ſacks per acre, reckoned only at 4s. a ſack —— ——	32	0	0

I wiſh it were in the Society's power to recommend ſtrongly and effectually the culture of at leaſt an acre or two of potatoes annually in every pariſh* for the uſe of the poor only; as they could not be ſaid to want food, if they had a plenty of this valuable root.

I am, &c.

J. A.

Feb. 27, 1783.

ARTICLE X.

On the Virtue of Aſhes as a Manure.

[By a Correſpondent Member.]

GENTLEMEN,

FROM the enquiries I made when at Bath laſt winter, I find that aſhes are but little uſed as a manure in the Weſtern Counties. As I have ſome reaſon to believe this neglect is owing to the uſe and virtue of aſhes not being generally known, I beg leave to offer you a few remarks on the ſubject, which ariſe both from my own obſervation, and from the accounts given by thoſe who have experienced the advantages ariſing from the uſe of aſhes judiciouſly applied to their lands.

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* We cannot but earneſtly recommend this gentleman's propoſal as an exceeding good one. Were country pariſhes, where the poor are numerous, to plant potatoes at their own charge, and have them delivered out as a part of the weekly allowance made to paupers, it might have a good effect, and be the cheapeſt method of relieving many of the poor, in winter eſpecially.

All aſhes produced from vegetable bodies contain fixed ſalt, blended with the earthy particles; and from theſe it is, that the alkaline ſalts, called pot-aſh, pearl-aſh, &c. are extracted.

Mortimer tells us, that aſhes of *all* kinds contain in them a very rich fertile ſalt, and that, therefore, they are the beſt of any manures for cold land, eſpecially if kept dry, and the ſalts be not waſhed away by the rains. One load of *dry* aſhes will be equally efficacious with two loads that have been kept wet. Two loads of the former will be ſufficient for an acre. And that they are very efficacious is experienced by many perſons in the Eaſtern and Northern counties, where great improvement has been made by burning ferny ſtubble, bean ſtalks, heath, furze, and ſedge.

Coal-aſhes are ſomewhat different in their nature, and being of a calcarious quality, are particularly beneficial to four ſtiff ſoils:—for this purpoſe they are very ſucceſsfully uſed in the neighbourhood of London, Norwich, and ſome other great cities, where coals are generally burnt as fuel. They open and meliorate clayey lands, and correct their ungenial qualities.

They are likewiſe very uſeful in bringing into order grounds which have been dug for brick earth; as is well known in the neighbourhood of London.

After ſpreading theſe aſhes on the clay bottoms, they plough them in, not very deep, and then ſow horſe-beans, or ſometimes lay them down with ray-graſs, which moſtly ſucceeds very well.

Mortimer and Bradley both agree, that ſea-coal aſhes are the beſt and moſt laſting manure for cold lands; and the fitteſt to kill worms and other inſects.

Even ſo early as in Mr. Worlidge's time they were looked upon as excellent compoſt, when mixed with horſe-dung. And he tells us, that they kill moſs and ruſhes in moiſt grounds.

Aſhes from kilns, where ſtraw and furze are burnt, are a very good manure for moſt kinds of ſoil. Many farmers uſe them as a top-dreſſing for corn and graſs, but they ſhould never be laid on in windy weather. They ſucceed beſt juſt before rain or ſnow falls, as theſe waſh them into the ſoil.

Peat-aſhes are alſo a very good manure, eſpecially if mixed with lime before they are ſpread.

Ellis, in his Modern Huſbandry, has judiciouſly obſerved, that there is a conſiderable difference between the aſhes of lean peat and thoſe of the fatty kind.

If barley be ſown ſo late as in May, *lean peat* aſhes in particular may be applied over it, or harrowed in with the grain. But aſhes burnt from fat black peat, ſuch as is dug about Newbury in Berkſhire, and in ſome parts of the Iſle of Ely, are of ſo ſulphureous a nature, that farmers are afraid to lay them on their barley; nor do they dreſs their wheat with them till late in the ſpring.

The earth, of which theſe rich aſhes are made, is taken from a black mooriſh ground, with narrow wooden ſcoops, which bring it out in the form of a long brick. After being dried, they are burnt in large heaps, admitting as little air to the fire as poſſible.

The great uſe of theſe aſhes was diſcovered near eighty years ago; but, like ſome other things, they ſoon fell into diſgrace by injudicious management; ſome people imprudently laid them on their lands in too large quantity at a time, by which means their corn was burnt. But afterwards they found that about eight buſhels were ſufficient to be ſown over an acre of wheat, peaſe, turnips, clover, rape, or ſainfoin; and this as early as poſſible.

Theſe aſhes contain at leaſt double the quantity of ſulphur that is found in any other. And therefore, if ſown too thick, and a dry ſeaſon ſhould enſue, they are apt to burn the tender fibres of the corn. They deſtroy ſlugs, on peaſe crops and other grain, better than any thing. But no danger need be feared from the aſhes of peat or turf which grow on ſandy bottoms, and contain the roots of thyme and heath.

Soap-aſhes are a compoſition of wood-aſhes and lime, which remain after the ſoap-makers have drawn off their ley or lees.

Two loads of theſe aſhes are ſufficient for an acre of arable land; and by the aſſiſtance of this manure, the ground will not only yield a large crop, but may be ſown conſtantly without fallowing for many years together. They ſhould be laid on in the beginning of winter, that the rain may the more eaſily diſſolve and waſh them in. Sir HUGH PLATT tells us, that by manuring a piece of barren land in Middleſex with theſe aſhes, in the year 1594, he obtained an excellent crop of ſummer barley.

I have in many experiments found great advantage from the ſoaper's aſhes on cold ſour meadow land, and am fully convinced, that if any farmer can procure them, including carriage, at the expence of twelve ſhillings a waggon load, they will be the cheapeſt and moſt profitable manure he can lay on ſuch ſoils.

I am, &c.

J. B.

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ARTICLE

Article XI.

From the Rev. Mr. Swayne, of Pucklechurch, Glocesterſhire, with Specimencs of Graſs Seeds.

Mr. Rack,

THE parcels which accompany this contain a quantity of the fine Bent Graſs ſeed in the blade, and a little of the Creſted Dog's-tail; which, with what I have before tranſmitted to you, complete a ſmall collection of the graſs ſeeds, for which a premium has been offered by the Society for theſe three years paſt.

The difficulty of collecting them has been much greater than I at firſt apprehended. But as a ſeparate cultivation of the good graſſes appears to me to be a great deſideratum in the ſyſtem of agricultural improvements, and as the Society had hitherto failed of obtaining any ſeed to begin their experiments with, I was determined to procure, this ſeaſon, if poſſible, ſome ſeed of each of the ſorts advertiſed in the Society's liſt.

In this purſuit, from the earlieſt part of the ſpring, I made my obſervations on the ſeveral graſſes, as they occurred to me in my walks about the fields. I remarked thoſe particular fields and meadows where each ſort grew in the greateſt abundance. I picked ſpecimens of each when in full bloom, and carefully compared them (being myſelf but a novice in Botany) with the deſcriptions of the graſſes given in Dr. WITHERING's Botanical arrangement. I examined them in their growth from time to time, and, when ripe, attended to the gathering them with unremitting application.

Had I not taken theſe methods, notwithſtanding my great deſire to accompliſh this my favourite ſcheme, I ſhould, moſt probably, have been unſucceſsful; or, if not wholly unſucceſsful, ſhould have collected ſo ſmall a quantity as would have been unworthy of the Society's acceptance: for the early graſſes, ſuch as the Annual Poa, Vernal and Meadow Foxtail, though very conſpicuous when in bloſſom, and indeed more ſo than many other graſſes; yet, when their ſeeds ripen, are wholly overtopped, and almoſt obſcured by the tall oat, rough cockſpur, meadow feſcue, and other ſurrounding graſſes, which being naturally of a taller growth, and ſpringing in a warmer ſeaſon, conſequently vegetate with much greater luxuriance.

If I had neglected to cultivate an intimate acquaintance wlth them in their flowering ſtate, I ſhould, moſt likely, have been deceived by their appearance at ſeed time, and have gathered improper ſpecies. This I ſuſpected, and therefore took that neceſſary precaution to guard againſt it. Beſides, the ſeeds of moſt of the graſſes fall from the huſks within a very ſhort time after they are ripe, and many of them before to appearance they are ſo: ſo that if they are not carefully and conſtantly watched, a few days neglect will deprive you of the opportunity of collecting them for the whole ſeaſon. This, I am afraid, will prove an obſtacle not eaſily to be ſurmounted in the cultivation of ſome of theſe graſſes; though there are others of them, which I believe will be found the moſt valuable, that do not come under this predicament.

Even with all my care and attention I have not ſucceeded to my wiſhes. I could have wiſhed to have preſented to the Society a much larger collection of the whole; being apprehenſive, from the total deficiency of former years, that I ſhall at preſent prove to be the only labourer in this harveſt. But there is one ſort, viz. the Meadow Foxtail, in which I have been particularly unfortunate; and this, through a defect which I had no ſuſpicion of at the time of its bloſſoming. At that time I had remarked this ſpecies to be peculiarly beautiful and flouriſhing; but, on rubbing out the huſks, when I judged the ſeed to be approaching to ripeneſs, I found almoſt every ſeed-veſſel occupied by a ſoft ſubſtance, of a deep yellow or orange colour, no ways reſembling a ſeed. On applying the microſcope, this ſubſtance proved to be a congeries of animalcules; which, being ſhook out on a ſheet of white paper, and ſeparated from each other, diſplayed the exact ſhape and motion of thoſe inſects which are oftentimes found in hams and bacon, and which are known among houſewives by the name of hoppers. The flies likewiſe, which theſe caterpilllars produce, were found to be very like the hopper-flies, only infinitely ſmaller.

I examined this graſs on many different ſoils and ſituations, but it ſtill preſented the ſame appearance. This deterred me from any farther attempts to collect it this ſeaſon; as it had been to no purpoſe to have gathered a large quantity of ſtraw, without the chance of obtaining ſome ſeed from it.

Whether it is uſual for it to be infeſted with theſe inſects in every ſeaſon, I am not at preſent able to diſcover. But this I am aſſured of, that if it be not an extraordinary circumſtance, it will for ever prevent the raiſing of this graſs by ſeed from becoming a general operation in agriculture.

I beg leave to ſubjoin a few remarks on each of the graſſes I have collected, in the order they were found to ripen, with the view that they may probably be of ſome little uſe to the perſon who is to direct the cultivation of them.

1ſt. The firſt was the ANNUAL POA.

Of this I gathered a quantity ſo early as the month of April. Its ſeeds drop off before they are dry, and to appearance before they are ripe. The utmoſt care is therefore neceſſary in gathering the blades, without which very few of the ſeeds will be ſaved. It ripens from the middle of April, to ſo late, I believe, as the end of October; but moſtly diſappears in the middle of the ſummer. It grows in any ſoil and ſituation, but rather affects the ſhade.

2dly. The ſecond was the VERNAL.

This coſt me more labour and time in collecting, than either of the other ſorts, owing to its being ſurrounded with taller graſſes at the time of its ripening, and being almoſt hid among them.

If it be not carefully watched when nearly ripe, and gathered within a few days after it comes to maturity, great part of the ſeed will be loſt. The twiſted elaſtick awns, which adhere to the ſeed, lift them out of their receptacles with the leaſt motion from the wind, even while the ſtraw and ear remain quite erect. It was found moſtly in the moiſt parts of meadows; very little of it on dry paſtures. It flowers about the beginning of May; and is ripe about the middle of June.

3dly. The MEADOW FOXTAIL.

This occurred in moſt meadows, particularly near hedges. It flowers ſomewhat later than the Vernal, and is ripe the latter end of June.

4thly. The FLOTE FESCUE.

This was found only in pools, wet ditches, and other very ſpringy places. Its ſeeds drop off with the leaſt touch, before they are nearly dry. It flowers the latter end of May, and is ripe in June.

5thly. The GREAT POA.

This graſs affects chiefly the dry parts of meadows; though it is to be found on moſt good paſtures. It is more retentive of its ſeeds than either of the graſſes I have met with; it may therefore be ſuffered to remain 'till the ſtalks are quite dry. It bloſſoms the beginning of June, and its ſeeds are ripe in July.

6thly, The Common Poa.

This I ſhould rather call the *Great Poa*; the flowering ſtalks being of a much taller growth than the former: but this the Linnæan ſyſtem forbids. One of the ſpecifick characters of the *Common Poa* [*Poa trivialis*] in that ſyſtem is, that it contains only three florets in each little ſpike, which perfectly agrees with this graſs: whereas the *Great Poa* [*Poa Pratenſis*] is deſcribed as containing *five*, which anſwers to the former. I have obſerved this graſs to grow in great abundance, even to the excluſion of almoſt all other kinds, in thoſe places in meadows over which the water has been conſtantly flowing the whole winter.

I am quite of opinion that this is the graſs which the very ingenious Mr. Anderson, in his Diſquiſitions on Agriculture, wiſhes to diſtinguiſh by the name of the *Vernal ſoft Graſs*, and which he is certainly miſtaken in ſuppoſing to be the *Holcus Lanatus* of Hudſon.

This very accurate deſcription leaves me no room to doubt that it is this very graſs, viz. the

Common Poa. The cicumſtance of its flouriſhing ſo much when almoſt conſtantly overflown, ſeems to premiſe, that it will prove a moſt valuable graſs for water meadows. It flowers the beginning of June, though ſomething later than the former, and ripens the beginning of July. The pannicle and ſtalks may not be permitted to ſtand till they are dry like the former, but muſt be gathered before the ſeeds are ſcarcely ripe, or the greateſt part of them will be ſcattered on the ground.

7thly. The SHEEP'S FESCUE.

I apprehend this to be the moſt valuable graſs of all. It was obſerved to grow and thrive on lands of all qualities and in all ſituations, from the drieſt upland paſtures, to the very moiſt parts of meadows. It does not part with its ſeeds till ſome time after they are ripe, and even quite dry. It makes the thickeſt and cloſeſt pile of any of them, and ſends up but few flower-ſtalks in proportion to its leaves. I am almoſt perſuaded, that this graſs will hereafter become as generally cultivated as Ray-graſs is at preſent. It flowers in June, and is ripe in July.

8thly. The MEADOW FESCUE.

This was found univerſally in meadows and rich paſtures; it is rather a coarſe graſs, and does not retain its ſeeds near ſo well as the former. It flowers in June, and is ripe in July.

9thly. The YELLOW OAT.

This abounded chiefly in dry paſtures. It retains its ſeed better than ſome other of the graſſes; flowers in June, and is ripe in July.

10thly. The CRESTED DOG'S-TAIL.

This is a very common graſs, affecting rather dry land; and is the eaſieſt of the whole group to collect a quantity of ſeed from. It flowers in June, and is ripe in July.

Laſtly. The FINE BENT.

This graſs, the ſecond in the Society's liſt, flowers and ripens its ſeed the lateſt of them all. It ſeems to be loſt the former part of the year, but vegetates luxuriantly towards the autumn. It appears to be fond of moiſt ground. It retains its ſeed till full ripe; flowers the latter end of July, and is ripe the latter end of Auguſt.

I am, your humble ſervant,

G. SWAYNE.

Pucklechurch, Sept. 15, 1781.

P. S. I have

P. S. I have preſerved ſpecimens of the above graſſes, and ſeveral others collected this ſummer, which I ſhall beg your acceptance of, as ſoon as an opportunity preſents itſelf of tranſmitting them with ſafety.*

ARTICLE XII.

On watering Meadows; and the Kinds of Water found moſt efficacious for that Purpoſe.

Piddletoun, March 8, 1783.

SIR,

MY experience and knowledge of the ſubject you are, in the name of the Society, ſo flattering as to requeſt me to give, are very much at their ſervice.

To the queſtion, "What water do the farmers "in your county prefer?" I can eaſily anſwer, "That which has run ſome courſe, particularly

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* Theſe Specimens, with conſiderable additions, have ſince been ſent to the Society, and an honorary Premium of a piece of Plate, value Ten Guineas, unanimouſly voted at the Annual Meeting in 1786, and preſented "to the Rev. GEORGE SWAYNE, for his elegant ſpecimens of Graſſes and collection of Graſs Seeds."

when

when it has been aſſiſted by the run of farm-yards, arable-lands, ſheep-ſleights," &c. &c. This is the general opinion of the watermen and farmers here; they all agree that the leſs the water is ſtrained, and the nearer they take it from the river, the better it is, and the more it enriches the meadows, particularly when aſſiſted by the run of yards, &c.

When they are aſked to explain "What they mean by being *leſs ſtrained?*" They ſay, it is when the water is taken immediately out of the river, ſtream, &c. and conveyed upon the land, running directly off by the drains into the river again. If, inſtead of returning into the river, it be again conveyed upon the lands below, and thus repeated, it is then ſaid to have been ſtrained, and not ſo efficacious; but if it be taken out of the ſtream again, after it has run ſome way in the courſe, it is then called head-water, and uſed with ſucceſs. This is nearly the general idea of the country. I own it has never been ſatisfactory to me, and I juſt hinted as much in the Eſſay.

If an enquiry be made, "Where, and which "are the beſt water-meadows?" The anſwer is, *Thoſe above us.* Enquire there: Thoſe above us are better than ours, *for the water has not been ſo* *much ſtrained.* This muſt, if repeated, ſoon carry us very near the ſpring-head.

I beg to be underſtood, that when I mention the *ſpring-head,* the particular ſpot where the ſpring riſes is not meant, but as far below it as there is any appearance of ſprings in or near the bed of the ſtream, which will oftentimes in ſmall rivulets be one, two, or more miles, below the ſpring-head. Nor is there a moment's doubt but that at a very conſiderable diſtance below, there are many very good water-meadows equal to thoſe higher up, but not in general; the variety of ſoil, (for ſome may be found better there than at the ſpring-head) and other local circumſtances, I preſume, occaſion it.

This ſubject has often engaged my attention when I have been in meadows formed of a variety of ſoils. Every one readily admits, that the ſame water, at the ſame time, will have different effects upon different ſoils; ſuch as, a cold clay; a warm ſand, or gravel; and a boggy, deep, corky ſoil; therefore ſomething muſt be attributed to the ſoil.

To explain myſelf more fully, I beg leave to claſs the lands capable of being watered by ſmall ſtreams, or rivulets, into three diviſions.

The firſt, are thoſe lands which lie at or nea the ſpring-head. The ſoil of this diviſion is generally a light loam, tolerably firm though wet, and not more than from ſix inches to a foot deep; the under-ſtratum a ſpringy gravel. This claſs (as I ſaid before) extends often much farther down the ſtream in ſome vales than others.

The ſecond diviſion I begin to diſtinguiſh where the ſoil gets deeper and heavier, often inclining to a clay or clayey loam, with ſome gravel in it. (This ſpecies is very cold, and the graſſes ſpring late.) Under this claſs may be reckoned a black, ſpungy, looſe, corky ſoil; the ſtream here (which before was ſmall) becomes larger conſiderably, and the lands on each ſide, which before were narrow, now ſpread to a conſiderable breadth. Under this diviſion the larger quantity of water-meadow in this country falls.

The third diviſion is compoſed of thoſe lands which lie flat, the ſoil very deep and looſe, often a moraſs, the bed of the river a bottomleſs ooze; a wear cannot well be erected acroſs it, nor the water drained off; little uſe is therefore ever made of it.

Upon lands of the firſt diviſion, the water, though moſtly perfectly clear, iſſuing immediately from the ſprings, and without any foreign aſſiſtance, has an amazing effect; the fertilizing quality is really aſtoniſhing. Meadows under this deſcription, if eaten quite bare in the month of May, will, in *five*, *ſix*, or *ſeven* weeks, have as much graſs in them as the mower can throw out with his ſcythe;* from one to two and often three good waggon-loads an acre. Add to this, the herbage being better, is of more value, and the meadows juſtly eſteemed the beſt.

Lands of the ſecond diviſion are certainly greatly benefited by the water being thrown over them, perhaps as much as the other, conſidering the difference of the two ſoils in their natural ſtate. This water having received all the advantages of the run of farm-yards, ſtreet dirt, arable lands, &c. the produce is very great. The quality, and indeed the quantity, is (I believe) always in proportion better or worſe, as the ſoil and ſituation approach the firſt or third diviſion.

Lands under the third deſcription, I have had no experience in. I have hardly ever heard that any thing is made of them. Their produce is ruſhes, ſedge, and a coarſe three-ſquare graſs.

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* Half-a-crown an acre is the price generally given for mowing.

I think it reaſonable to believe, that the ſecond diviſion of land is greatly improved by the water's having been aſſiſted by the adventitious increaſe of the running of farm-yards, &c. falling into it in its paſſage. And it is probable, that the firſt diviſion would be improved, if the ſecond diviſion of water could be conveyed upon it; but whether equally ſo as with its own water, is a queſtion.

I think I am juſtified in ſaying, that the ſecond ſort of land would be vaſtly improved by the firſt diviſion of water being thrown over it. I ground my opinion upon an obſervation I have frequently made, that in a ſeries of dry weather, when the ſtream from the ſprings, as I imagine, could not have received any foreign aid, being conveyed over lands of the ſecond diviſion, and as clear as if it had iſſued immediately from the ſpring-head, the vegetative powers, particularly if in warm weather, have been ſo wonderfully exerted, that in a few days a beautiful verdure has ſucceeded a parched ruſty appearance. Here I think a queſtion ariſes, "Whether the ſoil, or the quality of the water, contribute moſt to make the firſt diviſion of land better than the ſecond?" And I ſhould be very glad to ſee a reaſon given, why perfectly clear water being thrown over the meadows in the warm months, and kept there a few days too long, not ſtagnated, ſhould, when drawn off, leave a thick ſcum upon the graſs, which ſoon becomes ſo glutinous, as to attain a ſubſtance not unlike white leather?

I have juſt ſeen a letter from Mr. YOUNG, ſaying, that Dr. PRIESTLEY has given a new theory of vegetation, by his phlogiſton, contrary to his opinion; and as the Doctor quoted page 11 of the Treatiſe on Water-Meadows, in ſupport of it, Mr. Young wiſhes me to inform him, "Whether I did not know inſtances to the contrary?" I am by no means equal to the taſk of entering into the merits of the diſpute. My experience juſtifies me to declare, that I have ſeen as great improvement upon land watered with quite clear water as I ever did by thick muddy water.

I have had the pleaſure to ſee a copy of Mr. WIMPEY's letter to you: I am happy to find the ſubject treated in ſo maſterly a manner; and am not ſurprized to find him differ ſo much from me in what he ſays upon land ſprings; they probably have not fallen ſo much under his obſervation. I write from facts that are every day under my eye.

You will be pleaſed to obſerve, upon the whole, I by no means declare that the run of farm-yards,

&c. is not aſſiſting; quite the reverſe: I believe it does a great deal. All I contend for is, that clear water appears at and near the ſpring-head to have every advantage the other has below, and that the quantity of herbage is greater, and the quality better. The reaſon I ſubmit to the curious; but, viewed in every light, the quantity of land of the firſt diviſion is ſo ſmall compared with the ſecond, that in point of national utility there can be no doubt.

And I candidly own, that there are ſprings iſſuing out of the bogs in heaths, of which no uſe is made, becauſe, *they ſay*, the water has no enriching quality belonging to it; but there the ſoil is a deep bog inclining to a moraſs, and, excepting in the winter, little water iſſues out.

I am, Sir,

Your moſt obedient humble ſervant,

GEORGE BOSWELL.

P. S. The part of the country I am ſituated in is every where ſurrounded by chalk hills, ſome near the ſprings, and no where more than two miles diſtant (viſible.)

ARTICLE

Article XIII.

On divers Articles of Norfolk Huſbandry.

[By a Gentleman Farmer near Norwich.]

Dear Sir,

IN anſwer to your enquiry about the ſetting of wheat:—From my own obſervations near home, and the information of others from different parts of this county, I find it is become general, and this year almoſt univerſal, owing in part, perhaps, to the high price that grain now bears.

We have neither hit upon, nor indeed attempted any other courſe of crops on our ſtrong heavy lands than thoſe we practiſe on our light ſoils. Turnips well hoed twice are equally cultivated upon both, and without any material inconvenience to the farmer, or injury to the land. On the light ſoils, we feed them off with ſtock in the field where they grow: On heavy wet lands, we draw them and carry them off in light carts, to be eaten either in ſome graſs or unploughed ſtubble field, or in the houſes or yards at home.

I prefer the latter practice much, and have always uſed it, although the greater part of my farm would very well admit of feeding them where they grow. My reaſons for preferring this latter method are, that there is no waſte of the turnips;—that the food comes equally freſh to the beaſts every day;—that the protection from cold and wet weather, which the cattle enjoy in houſes, or well fenced and ſhedded yards, (as mine are) contributes very much to their health and fattening, (much more ſo, indeed, than is generally conceived;) and that by this means I collect and preſerve all their dung to be laid on ſuch fields, and at ſuch times as will be moſt beneficial to the enſuing crops. Theſe advantages are all loſt in the method of feeding off the turnips on the fields; for even half the dung of the beaſts, feeding in the fields in the depth of winter, is loſt by being dropt under the hedges or trees, to which, after filling themſelves, they flee for ſhelter and warmth.

The expence of carting away an acre of turnips depends on the goodneſs of the crop, and is from ten to fifteen ſhillings; which, although it is much more than ſaved in the preſervation of the turnips from waſte, yet inclines the covetous and indolent to feed them off the land; for they flatter themſelves they have no waſte while they have lean ſheep or bullocks, which will eat up the offal that the fat ones have left, not conſidering how much better their ſecond or lean ſtock would thrive with clean and freſh food.

You aſk me, if beans and wheat, alternately, would not obviate the neceſſity of fallowing heavy lands, and prove for a conſiderable length of time a beneficial mode of cropping the ground. As I have not experienced the practice, I can only conjecture, and tell you, that ſome little time ſince I intended to have tried the experiment on two pieces of ſtiff wet ground, which I have laid to graſs; and that I have very little doubt but that, if the bean crops be ſometimes manured for, and always well hoed, this mode would be a moſt profitable one, and, for any reaſon I can ſee to the contrary, might endure for ever; but ſtill, as it does not raiſe winter food for cattle, I muſt, for the ſake of their dung, prefer turnips to it, wherever they can be raiſed.

I am, Sir,

with ſincere regard and eſteem,

Your moſt humble ſervant,

T. B.

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ARLICLE XIV.

On the Cultivation of Barley.

[By a Gentleman Farmer in Norfolk.

GENTLEMEN, *S—m, Jan.* 4, 1781.

THE method of raiſing barley is in general ſo well underſtood, that it may perhaps be thought impertinent in me to offer any thing on that head. But as the gaining a knowledge of the different modes of practice in different counties ſeems to be one part of your deſign, I will take the liberty of ſending you a few hints relative to this branch of huſbandry.

The beſt ſoil for barley is that which is dry and healthy, rather light than ſtiff, but yet of ſufficient tenacity and ſtrength to retain the moiſture. On this kind of land the grain is always the beſt-bodied and coloured, the nimbleſt in the hand, and has the thinneſt rind. Theſe are qualities which recommend it moſt to the maltſter. If the land be poor, it ſhould be dry and warm; and when ſo, it will often bear better corn than richer land in a cold and wet ſituation.

In the choice of your ſeed it is needful to obſerve, that the beſt is of a pale lively colour, and brightiſh caſt, without any deep redneſs, or black tinge at the tail. If the rind be a little ſhrivelled, it is the better: for that ſlight ſhrivelling proves it to have a thin ſkin, and to have ſweated in the mow. The neceſſity of a change of ſeed, by not ſowing two years together what grew on the ſame ſoil, is not in any part of huſbandry more evident than in the culture of this grain, which, if not frequently changed, will grow coarſer and coarſer every ſucceeding year.

It has generally been thought that ſeed-barley would be benefited by ſteeping; but liming it has, in many inſtances, been found prejudicial. Sprinkling a little ſoot with the water in which it is ſteeped, has been of great ſervice, as it will ſecure the ſeed from inſects. In a very dry ſeed-time, barley, that has been wetted for malting, and begins to ſprout, will come up ſooner, and produce as good a crop as any other.

If you ſow after a fallow, plough three times at leaſt. At the firſt ploughing, lay your land up in ſmall ridges, and let it remain ſo during the winter, for the froſt to mellow it; the ſecond ploughing ſhould be the beginning of February.

In March ſplit the ridges, and lay the land as flat as poſſible, at the ſame time harrowing it fine. But in ſtrong wet lands (if you have no other for barley) lay it round, and make deep furrows to receive the water.

I have often taken the following method with ſucceſs: On lands tolerably manured, I ſowed clover with my barley, which I *reaped* at harveſt; and fed the clover all the following winter, and from ſpring to July, when I fallowed it till the following ſpring, and then ſowed it with barley and clover as before. Repeating this method every year, I had very large crops: but I would not recommend this practice on poor light land.

We ſow on our lighteſt lands in April, on our moiſt lands in May; finding that thoſe lands which are the moſt ſubject to weeds produce the beſt crops when ſown late.

The common method is to ſow the barley-ſeed broadcaſt at two ſowings; the firſt harrowed in once, the ſecond twice; the uſual allowance from three to four buſhels per acre. But if farmers could be prevailed on to alter this practice, they would ſoon find their account in it. Were only half the quantity ſown equally, the produce would be greater, and the corn leſs liable to lodge: for when corn ſtands very cloſe, the ſtalks are drawn up weak, and on that account are leſs capable of reſiſting the force of winds, or ſupporting themſelves under heavy rains.

From our great ſucceſs in ſetting and drilling wheat, ſome of our farmers tried theſe methods with barley, but did not find it anſwer their expectations, except on very rich land.

I have myſelf had eighty ſtalks on one root of barley, which all produced good and long ears, and the grain was better than any other; but the method is too expenſive for general practice. In poor land, ſow thin, or your crop will be worth little. Farmers who do not reaſon on the matter, will be of a different opinion; but the fact is indiſputable.

When the barley is ſown and harrowed in, the land ſhould be rolled after the firſt ſhower of rain, to break the clods. This will cloſe the earth about the roots, which will be a great advantage to it in dry weather.

When the barley has been up three weeks or a month, it is a very good way to roll it again with a heavy roller, which will prevent the ſun and air from penetrating the ground to the injury of the roots. This rolling before it branches out, will alſo cauſe it to tiller into a greater number of ſtalks; ſo that if the plants be thin, the ground will be thereby filled, and the ſtalks ſtrengthened.

If the blade grows too rank, as it ſometimes will in a warm wet ſpring, mowing is a much better method than feeding it down with ſheep, becauſe the ſcythe takes off only the rank tops; but the ſheep, being fond of the ſweet end of the ſtalk next the root, will often bite ſo cloſe as to injure its future growth.

By attending to what I here recommend, many of our farmers uſually get forty buſhels of barley per acre from land of no extraordinary quality. On ſome that is rich, I have had fifty-two buſhels without manure; but I never ſow more than ten, and often only eight pecks of ſeed per acre.

I am, &c.

J. S.

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ARTICLE XV.

On the Advantages of cultivating Turnips, Scotch Cabbage, Lucerne, &c.

[By a Gentleman Farmer in Hertfordſhire.]

GENTLEMEN, *H—n, March* 6, 1781.

BEING diſappointed of ſeeing your ſecretary when I was at Bath laſt month, I take the liberty of communicating by letter, a few obſervations, which I intended to have made to him, on the number of cattle and ſheep which may be fed on crops of turnips, turnip-rooted cabbages, and Scotch cabbages, of a certain given weight, by which the comparative value of ſuch crops may be accurately eſtimated.

When ſheep are allowed as many turnips as they will eat, (which ſhould always be the caſe while they are fattening) they will on an average conſume near twenty pounds each, in 24 hours.

An acre of turnips twice hoed will, if the land be good, produce about fifty tons; which will, on the above calculation, maintain one hundred ſheep fifty-two days. My ſheep weigh in general twenty pounds a quarter.

Turnip-rooted cabbage will produce from twenty-five to thirty tons per acre; and for *ſpring-feed* are certainly the moſt valuable crop within the whole circle of huſbandry. They are invulnerable to froſt, either in or out of the ground. When farmers are in the greateſt diſtreſs for ſheep-feed, during the months of March and April, theſe are an unfailing ſupply, and afford more milk for the lambs than any other food whatſoever. They are alſo a firmer and more ſubſtantial food than turnips, even if the latter could be had good in that ſeaſon. I have kept them out of the ground near twelve months, through the extremes of heat and cold; and at the end of that time, a very few excepted, they were all ſound.

As the roots of this plant are firmly fixed in the earth, it is leaſt trouble to feed them off; but if you want to plough early, they may be drawn with a prong, and, if thrown on a dry paſture, they will keep equally good for ſheep in the ſpring. An acre of turnip-rooted cabbage will maintain one hundred ſheep a month, and ſometimes five weeks.

Scotch cabbages, if they be the true flat-topt firm kind, are never affected by froſt, a few of the outſide leaves excepted. On land not worth more than twelve ſhillings per acre, I have had fifty-four tons per acre. An ox will in common eat about two hundred pounds in 24 hours.—Twenty oxen therefore may be kept near five weeks on an acre of cabbages of that weight; but as the crops in general are not ſo large, we will reckon only a month, which will be cheaper than a ſcore of oxen can be kept on any other food.

A ſheep of twenty pounds a quarter will eat fifteen pounds of Scotch cabbages in twenty-four hours. An acre will therefore maintain two hundred ſheep a full month.

When cows and oxen are fed with cabbages, their dung is more in proportion than when fed with turnips, which go off more in urine; or than with hay, which is of too dry a ſubſtance. If the cabbages are planted in rows three feet apart, the intervals may eaſily be kept free from weeds by the horſe-hoe, and the roots of the plants will receive great benefit by the ground being thus looſened about them. Cabbages, being a meliorating crop, do not impoveriſh the land nearly ſo much as grain.

I will now add a few remarks on Lucerne, a plant which merits every poſſible encouragement. Some years ſince I divided a field of two acres into four parts, and ſowed it with Lucerne, in the following manner:——

1ſt part, in drills three feet aſunder.
2d part, in drills two feet ditto.
3d part, in drills one foot ditto.
4th part, broadcaſt.

The ſoil was equal throughout the field. The ſeed was ſown on the 24th of April; on the 16th of Auguſt I cut the whole field, and weighed the produce of each part ſeparately.

That ſown in three-feet drills produced only about half the weight of that ſown broadcaſt, and the reſt in proportion, leſſening as the width of the rows increaſed. Having been taught to believe, that the three-feet drills would produce *moſt*, I was diſappointed in finding that crop to be the leaſt of any in the field, and too haſtily reprobated the drill method of ſowing it. I was however adviſed by a gentleman, who underſtood the culture of this graſs better than myſelf, to let the whole field remain three years, to give it a fair trial, before I paſſed judgment. I did ſo. The ſecond year the difference was greatly in favour of the three-feet drills; and in the fourth year they had a very decided ſuperiority. I then found the true ſtate of the caſe to be as follows:—

During the firſt year the plants in every part of the field were nearly equal in goodneſs; but as there was a much greater number of them on an equal ſpace of ground in the part ſown broadcaſt, the crop muſt of courſe be heavieſt there; theſe plants being as good the firſt year as afterwards. But in the courſe of three years, the plants in the three-feet drills became much ſtronger, ſpread amazingly, and nearly filled up the ſpaces between them; the produce of one root being more than that of any ten roots in the broadcaſt part, which by ſtanding too cloſe were impoveriſhed, and could not increaſe in bulk like the others.

In the fourth year, the produce of the three-feet drills was more than double the broadcaſt, and being adapted to the horſe-hoe, were kept free from weeds, and earthed up at a ſmall expence in compariſon of the other.

At the end of the fourth year, I ploughed up the broadcaſt part, and planted it afreſh with roots from the one-foot drills, in rows three feet apart. The firſt ſeaſon I thought they ſeemed ſtunted, and would come to nothing, but the following ſpring they ſhot forth vigorouſly, and were nearly equal to the other.

Tranſplanted Lucerne never produces any thing the firſt ſeaſon; but in the ſecond, it is generally as good as that of three years growth which has never been moved.

Weeds are the greateſt enemy to Lucerne; and the eaſieſt and cheapeſt way of keeping the crop clean, is to ſow it in drills of ſufficient width to admit the horſe-hoe; which not only deſtroys them at the leaſt poſſible expence, but greatly promotes the growth of the plants, by earthing them up in the operation.

I am, &c.

J. D.

* * *

ARTICLE XVI.

On the Utility of thoſe Clubs called by the Name of Friendly Societies, *in Country Pariſhes.*

GENTLEMEN,

I HAVE been a Subſcriber to your Society from its firſt Inſtitution, although, from the remoteneſs of my ſituation, it has not been in my power to attend more than one of your meetings. Having however conſtantly received your Annual Premium Books, I have with pleaſure ſeen a number of the premiums judiciouſly offered, not only for the advancement of Agriculture, Planting, &c. but alſo as rewards for long-continued Induſtry and good Behaviour in Servants, &c.

As I venerate every attempt, either in Societies or in Individuals, to promote uſeful knowledge, improvements in the neceſſary arts, and happineſs in collective and civil Society, I wiſh to point out one ſubject which ſeems in a particular manner to merit your attention and encouragement:——

This is, the eſtabliſhment of Parochial *Friendly Societies* among handicrafts-men and poor labourers.

ers. Where theſe have been eſtabliſhed, and conducted by prudent rules and regulations, they have proved very comfortable reſources to many individuals, when age or affliction has diſqualified them for labour, and alſo leſſened parochial expences.

The Funds raiſed by theſe Societies may be conſidered as ſo much money ſaved from the alehouſe, to be applied in times of neceſſity to the beſt of purpoſes; and as each member contributes only *three-pence* a week, it is ſcarcely felt by individuals. But the advantage and relief which *ſeven ſhillings* a week affords to the *ſick*, the *lame*, and the *aged*, is very comfortable; and they are thereby freed from the painful neceſſity of applying to their pariſhes for ſupport.

As theſe *Friendly Societies* are founded on one of the wiſeſt maxims in the code of human policy; —namely, *that it is eaſily in the power of the many to help the few*; I think they merit *publick* encouragement and ſupport. Therefore if your finances will admit, you cannot, perhaps, beſtow a few guineas better than in offering a premium to the following import:—

" That a premium of ——— guineas will be given to the moſt numerous Society of this kind, of not leſs than forty members, which ſhall, within the year 1783, be eſtabliſhed by labourers and handicrafts-men, in any country town or pariſh where no ſuch Society is at preſent inſtituted. The ſaid premium to be claimed as ſoon as the ſaid Society, of not leſs than forty members, has ſubſiſted one year.

" All claims to be accompanied with a certificate ſigned by the Miniſter and Churchwardens of the pariſh, containing an account of the number of actual members, and their names and occupations."

I have preſumed to offer the above propoſal on this principle, that whatever tends to make our labouring poor induſtrious and good œconomiſts, while in health, and to render them comfortable when under affliction, is worthy your conſideration; and that theſe Friendly Clubs or Societies have ſuch a tendency is, I think, ſelf-evident.

A poor man, flattered with the hope of receiving ſeven ſhillings per week in any future ſickneſs, will either work extra hours for the three-pence he has to pay, or ſave it from the ale-houſe. After he has been ſome years a member, it becomes habitual, and the fear of loſing all the money he has paid in, by forfeiting all the advantage he as a member is entitled to in caſe of accidents or illneſs, will operate ſtrongly in preventing him from declining his ſubſcription.

I have talked with many poor men who are members of ſuch Societies, and they all tell me they live as well as before, and find no difference at the year's end from having paid three-pence a week to their Club;—to uſe their own language, "*they don't feel it.*"—But in times of ſickneſs, when they could not labour, they have joyfully felt the comforts which their little public fund yielded them.

You will pardon me, Gentlemen, for dwelling ſo long on the ſubject; but as it ſtrikes me forcibly, I wiſh to impreſs your minds with correſpondent ideas of its utility.

I am, yours, &c.

Wilts. J. B.

[The ſociety fully agree in opinion with this benevolent correſpondent, reſpecting the utility of Friendly Societies amongſt the poor, and proper attention will be paid to his letter previous to the publication of their next liſt of premiums.]

ARTICLE

ARTICLE XVII.

SUNDRY HINTS,

Communicated by different Correſpondents.

GENTLEMEN,

IN the year 1740, the Sieur DE LA REVERE, at Paris, obtained a patent for making flannels, velvets, and other ſtuffs, of the cottony down of the Apocynum, or Dog's-bane. When I was in France about the year 1767, I ſaw ſome of this manufactory, and found that it anſwered very well, eſpecially when a little wool was mixed with it before ſpinning.

I alſo found that this cotton had long been highly eſteemed there for ſtuffing eaſy chairs, ſettees, and ſtools, and alſo for quilts, which rendered them very light and warm, the down being very elaſtick.

The great quantities of this down or cotton, which our hedge-rows produce every autumn, might, I think, be applied to ſome ſuch uſes in this country, as it appears to be of the ſame kind as that uſed in France.

I beg leave, therefore, to propoſe, that your Society may direct a trial to be made; and if it ſucceeds, that a premium may be offered for bringing it into common uſe.

W. I.

Trifling as the ſubject on which I addreſs you may at firſt view appear, I flatter myſelf you will not deem me impertinent in wiſhing to have a remedy pointed out for an inconvenience which has long been felt and complained of.

Gravel walks are ſome of the moſt uſeful and neceſſary ornaments in gentlemen's gardens; but the difficulty of keeping them clear from *green moſs* is very great.

I therefore ſubmit to your conſideration whether it might not be expedient for you to offer a ſmall premium for the diſcovery of a cheap, eaſy, and effectual method of deſtroying it, and preventing its growth.

A GARDENER.

I am of the opinion that crops of graſſes, as well as grain, might be much improved, and the quantity conſiderably increaſed, by a change of ſoil and ſituation, or, in other words, by changing the ſeed.

I ſome years ſince ſowed a ſmall field with marl graſs ſeed, which I procured from a gentleman in Kent, and the crop was much ſuperior to that of another field ſown with the ſame kind of graſs which had been raiſed in the neighbourhood; although the ſoil, and the quantity of ſeed ſown per acre, were the ſame.

There are myſteries in the nature and progreſs of vegetation, which no theory can account for. While the effects are evident, the cauſe remains inexplicable. Experience, therefore is our beſt director, and *that* ſeems uniformly to prove the utility of a change of ſeed in almoſt every production of our fields as well as gardens.

J. W.

THE following compoſition being an excellent colouring for pales, gates, rails, barns, and other outhouſe doors, &c. I take the liberty of recommending it to your Society in particular, and to the publick in general:—

Melt twelve ounces of reſin in an iron pot or kettle; add three gallons of train oil, and three or four rolls of brimſtone; and when the reſin as much Spaniſh brown, or red, or yellow oker, and brimſtone are melted and become thin, add (or any other colour you want) firſt ground fine with ſome of the oil, as will give the whole as deep a ſhade as you like. Then lay it on with a bruſh as hot and thin as you can. Some days after the firſt coat is dried, give it a ſecond. It will preſerve plank for ages, and keep the weather from driving through brick-work.

W. T.

As a proof of the ſurpriſing advantages that attend the planting or ſowing wheat in drills, and the immenſe ſaving of ſeed by that method, I beg leave to mention the following inſtance, which fell within my own obſervation:—

Some years ſince, Mr. WHEATLY, of Morden, in the county of Cambridge, planted an acre of land with wheat, leaving a foot ſpace between every two kernels: The whole acre took up half a peck and one pint of ſeed, and the produce was thirty-nine buſhels.

Many of our beſt farmers are now got into the method of planting their wheat as they do in Norfolk, and their ſucceſs has overcome the moſt obſtinate prejudices which the common people entertained againſt ſo excellent a practice. They generally plant about two pecks per acre by hand, and moſtly on clover lays, at five ſhillings and ſixpence expence. Your ſociety can never turn their attention to a more intereſting object than the rendering this practice general; and ſo far as their endeavours to extend it are ſucceſsful, they will deſerve the thanks of the nation.

R. M.

To preſerve Seedling Turnips from the Fly.

To a quart of turnip-ſeed add one ounce of brimſtone finely powdered, putting both into a bottle large enough to afford room to ſhake them well together every day for four or five days previous to ſowing; keep the bottle well corked. This has by long experience been proved never to fail.

G. K.

Method of deſtroying Weevils in Wheat.

Monsieur de Brosses, firſt Preſident of the Parliament of Dijon in France, finding that the inſects called Weevils had got among ſome wheat at one of his farms, tried almoſt every method to get rid of them, but in vain, for his granaries ſtill continued infeſted with this voracious inſect. At length, being informed of a method to deſtroy them, which was quite ſimple, and not expenſive, and which had been practiſed with ſucceſs in the province of Poictou, he ſet about it in the following manner:——

He got ſome live lobſters, which he threw on the wheat that was infeſted, and in four hours time the weevils came out from all parts, diſperſing themſelves over the walls in ſuch numbers, that in many places they were quite black with them; and by this means they were all eaſily deſtroyed.

The ſmell of lobſters, particularly if left till they ſtink, always proves fatal to theſe inſects, and yet will not in the leaſt affect the corn. This remedy ſhould be uſed as ſoon as the weevils appear, or begin to make their neſts.

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ARTICLE XVIII.

On the Rot in Sheep.

[By a Gentleman Farmer near Glaſtonbury.]

GENTLEMEN,

HAVING examined many ſheep infected with the diſeaſe in the liver called the rot, I beg permiſſion to trouble you with a few remarks thereon, and which are principally intended to excite farther enquiry into the nature of this fatal malady.

That it is occaſioned by the inſects found in the liver, and which are called flukes, is very evident: but to account for their coming into the liver is not ſo eaſy.

I am of the opinion that they are ſwallowed with the ſheep's food while in the egg ſtate. The common, or moſt obvious objection to that opinion is, that this inſect is never found but in the liver, or ſome parts of the viſcera, of ſheep that are diſeaſed more or leſs; and that they muſt therefore be bred there.

But

But this objection will loſe its force, when we conſider that many inſects undergo ſeveral changes, and exiſt under forms extremely different from each other. Some of them may therefore appear, and be well known under one ſhape, and not known to be the ſame under a ſecond or third. The fluke may be the laſt ſtate of ſome aquatic animal which we at preſent very well know under one or other of its previous forms.

If this be admitted, it is eaſy to conceive that ſheep may, on wet ground eſpecially, take multitudes of theſe ova, or eggs, in with their food; and that the ſtomach and viſcera of the ſheep being a proper nidus for them, they of courſe hatch, and, appearing in their fluke or laſt ſtate, feed on the liver of the animal, and occaſion this diſorder.

On killing a ſheep lately, which was ſeemingly in good health, I examined the viſcera carefully, and in ſome of the paſſages leading to the liver, (which appeared turgid) I found a whitiſh thick liquor, which appeared to be all in motion. On applying a pocket glaſs, I found it contain thouſands of theſe flukes, which were apparently juſt hatched, and about the ſize of mites. Theſe, if the ſheep had not been killed, would probably have ſoon obtained their uſual ſize, and proved its deſtruction.

I am therefore of the opinion, that if experiments were made by ſome of the faculty, to diſcover what would moſt ſpeedily kill theſe inſects when taken freſh and alive from a diſeaſed liver, it might lead to the diſcovery of ſomething that might have the ſame effect when given internally as a medicine. We find worms can be deſtroyed in the bodies of animals, and why not the fluke in the liver of a ſheep?

Mr. **Miller** ſays, that parſley is a good remedy for the rot in ſheep: Suppoſe a ſtrong decoction of this plant, or the oil extracted from its ſeed, were given to thoſe diſeaſed, it might poſſibly be of ſervice.

I am, &c.

J. C.

Street, near Glaſtonbury.

ARTICLE XIX.

On laying down Fields to Graſs, and the Kinds of Graſſes moſt valuable.

[By a Correſpondent in Suffolk, to the Secretary.]

SIR,

IN anſwer to your enquiries reſpecting our method of laying down fields to graſs, and the ſeveral ſpecies of graſſes moſt profitable, be pleaſed to accept the following remarks, which I hope will not be wholly unſatisfactory to your ingenious and publick-ſpirited Society.

The latter end of Auguſt, or the beginning of September, is the beſt ſeaſon for ſowing graſs-ſeeds, as there is time for the roots of the young plants to fix themſelves before the ſharp froſts ſet in. It is ſcarce neceſſary to ſay, that moiſt weather is beſt for ſowing; the earth being then warm, the ſeeds will vegetate immediately; but if this ſeaſon prove unfavourable, they will do very well the middle of March following.

If you would have fine paſture, never ſow on foul land. On the contrary, plough it well, and clear it from the roots of couch-graſs, reſtharrow, fern, broom, and all other noxious weeds. If theſe are ſuffered to remain, they will ſoon get above, and deſtroy your young graſs. Rake theſe up in heaps, and burn them on the land, and ſpread the aſhes as a manure. Theſe ploughings and harrowings ſhould be repeated in dry weather. And if the ſoil be clayey and wet, make ſome under-drains to carry off the water, which, if ſuffered to remain, will not only chill the graſs, but make it ſour. Before ſowing, lay the land as level and fine as poſſible. If your graſs-ſeeds are clean, (which ſhould always be the caſe) three buſhels will be ſufficient per acre. When ſown, harrow it in gently, and roll it with a wooden roller. When it comes up, fill up all the bare ſpots by freſh ſeed, which, if rolled to fix it, will ſoon come up, and overtake the reſt.

In Norfolk they ſow clover with their graſſes, particularly with ray-graſs; but this ſhould not be done, except when the land is deſigned for graſs only three or four years, becauſe neither of theſe kinds will laſt long in the land. Where you intend it for a continuance, it is better to mix only ſmall white Dutch clover, or marle graſs, with your other graſs ſeed, and not more than eight pounds to an acre. Theſe are abiding plants, ſpread cloſe on the ſurface, and make the ſweeteſt feed of any for cattle. In the following ſpring, root up the thiſtles, hemlock, or any large plants that appear. The doing this while the ground is ſoft enough to permit your drawing them by the roots, and before they ſeed, will ſave you infinite trouble afterwards.

The common method of proceeding in laying down fields to graſs is extremely injudicious. Some ſow barley with their graſſes, which they ſuppoſe to be uſeful in ſhading them, without conſidering how much the corn draws away the nouriſhment from the land.

Others take their ſeeds from a foul hay-rick, by which means, beſides filling the land with rubbiſh and weeds, what they intend for dry ſoils may have come from moiſt, where it grew naturally, and *vice verſa.* The conſequence is, that the ground, inſtead of being covered with a good thick ſward, is filled with plants unnatural to it. The kinds of graſs which I would chooſe to cultivate in paſture lands, are, the Annual Meadow, Creeping and fine Bent, the Fox-tails, the Creſted Dog's-tail, the Poas, the Feſcues, the Vernal Oat-graſs, and the Ray or Rye-graſs. I do not, however, approve of ſowing all theſe kinds together; for not to mention their ripening at different times, by which means you can never cut them all in perfection and full vigour, no kind of cattle is ſond of all alike.

Horſes will ſcarcely eat hay which oxen and cows will thrive upon; ſheep are particularly fond of ſome kinds, and refuſe others. The Darnel-graſs, if not cut before ſeveral of the other kinds are ripe, becomes ſo hard and wiry in the ſtalks, that few cattle care to eat it.

Such gentlemen as wiſh a particular account of the above-mentioned graſſes, will be amply gratified in conſulting Mr. STILLINGFLEET on this ſubject. He has treated it with great judgment and accuracy, and thoſe who follow his directions in the choice of their graſſes will be under no ſmall obligation to him for the valuable information he has given them.

The principal thing in the choice of graſſes is, to ſow only ſuch in the ſame field as ripen nearly at the ſame time.* By this means you will get finer hay than by any other method, and have much leſs trouble in making it.

I am, your moſt humble ſervant,

J. S.

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* Of what kinds theſe are, the reader will find an account in the Rev. Mr. *Swayne*'s very ingenious letter, page 76 of this volume.

ARTICLE XX.

On the Culture of Rape, or Cole.

[From a Correſpondent Member in Eſſex.]

GENTLEMEN,

PURSUANT to your requeſt, I take the earlieſt opportunity of giving you an account of the method in which rape-ſeed is cultivated in this county, where it is raiſed in large quantities, and to great advantage.

This plant will do on almoſt any ſoil, but ſucceeds beſt on thoſe that are deep, with a clayey bottom, with manure and deep ploughing.

We generally plough up the fallow early in the ſpring, and let it lie till the latter end of March. We then plough it again, after which we harrow it down, and lay on a coat of manure. After this is ſpread, we croſs-plough it again in May, and get it in fine tilth by the end of June.

About the firſt of July, or the firſt rain after that time, we ſow the ſeed, about half a peck on an acre. The ſeed is ſcattered with three fingers broadcaſt, and the land lightly harrowed and rolled.

In September, we hoe it in the manner we do turnips, ſetting the plants out at about a foot diſtance, and clear out the weeds. This hoeing coſts three ſhillings an acre, but it renders the plants much ſtronger than they otherwiſe would be, and makes them produce more ſeed.

If any part of the field miſs, we fill it up with plants from the thicker part, in the latter end of October, or beginning of November, which anſwers much better than tranſplanting them in January; for in the latter caſe, ſhould a ſharp froſt ſucceed, they would be moſtly killed from not being rooted; otherwiſe the ſevereſt froſt in this climate will not injure them.

The produce is from three to ſix quarters per acre, and the price laſt year was from twenty to twenty-two pounds per laſt.

The plants when young are in great danger from ſlugs, who prey on them voraciouſly. The beſt way of preventing this is to ſtrew over the plants a mixture of ſlaked lime, and wood-aſhes; ten buſhels of lime, and fifteen of aſhes, are enough for an acre. This not only deſtroys the inſects, but promotes the growth of the crop greatly, ſo that it gets to a ſtrong head before winter.

In the month of September, we cut and threſh it on a floor made in the field, and covered with a large cloth or waggon-tilt. The ſtraw and chaff are burnt for the ſake of the aſhes; but ſometimes, when the ſtalks are very ſtrong, we uſe them for incloſing fences in our farm-yards, to protect the cattle from winds in winter.

The idea that rape impoveriſhes the ſoil ſeems to be a miſtaken one; for we get very good crops of wheat after it. This plant ſhould not, however, be ſown two years together on the ſame land. It always does beſt after beans, turnips, or cabbages.

Moſt of our farmers let the reaping, threſhing, dreſſing, and putting the ſeed up for market, together with making the floor, at ſix-pence per buſhel; and when the crop is good, the men make great wages of it at that rate.

If the ſeed be large, black, and free from red ones, we reckon it good. If the crop be kept long before it is ſold, it ſhould be laid very dry, otherwiſe it will loſe its colour, and be much damaged.

Some of our farmers ſow rape-ſeed merely for the ſake of the winter-feed it affords our cattle. It is the moſt flattering of any winter feed for ſheep. They will thrive more on rape-ſeed plants in one month, than on turnips in two, if put in ſoon after Michaelmas. In this caſe, when the crop is fed off, we plough it up early in the ſpring, and always have a good crop of barley. But this method is not generally practiſed; for it requires great care and pains to clear the land of the rape-ſeed plants, which would, if not deſtroyed, ſoon grow up above the barley, and injure the crop. And beſides, whenever rape-ſeed is at a tolerable price, it is not making the moſt of it to feed it off.

There is one thing to be obſerved in ploughing for rape, which in general is little attended to; and that is, when you plough for ſowing, plough north and ſouth, if your field will admit of it; and then the land when ſown will lie full faced to the ſun, and receive a greater ſhare of its influence.

The greateſt inconvenience that attends this plant is, that its ſtraw is neither good for ſtover or manure; but we burn it into pot-aſh to tolerable profit.

If theſe few hints prove in any degree ſatisfactory, it will give pleaſure to

Your's, &c.

Birch near Colcheſter. J. B.

Article XXI.

On the Cultivation of Burnet.

[From a Correſpondent in Kent, to the Secretary.]

Sir, *Jan.* 15, 1783.

YOUR letter of December 20, reached me in due courſe, wherein you inform me that Burnet is a graſs but little cultivated in Somerſetſhire, and requeſt my thoughts on its uſefulneſs. I ſhall at all times be happy in communicating any thing that may tend to promote the views of a Society eſtabliſhed on ſo liberal a plan as that of Bath; and therefore it is with pleaſure that I comply with your wiſhes, ſo far as the knowledge of the ſubject will admit.

Burnet is not generally cultivated in this county; but ſome of our moſt intelligent farmers have raiſed it of late years with conſiderable ſucceſs.

I apprehend that one principal cauſe of its not having been more attended to, is the goodneſs of our ſoil, which will produce other crops that in general pay better than Burnet. But this is a reaſon which ought not to operate in countries which abound with poor land, to which this plant is better adapted than many others.

The cultivation of this graſs is attended with one principal advantage, beſides that of not requiring a rich ſoil; which is, that it proves an excellent winter paſture when hardly any thing elſe vegetates.

I might indeed mention ſeveral others; to wit, It makes good butter. It never blows or ſwells cattle. It is fine paſturage for ſheep; and will flouriſh well on poor, light, ſandy, or ſtony ſoils, or even on dry chalk hills.

The cultivation of it is neither hazardous nor expenſive. If the land be prepared as is generally done for turnips, there is no danger of its failing. After the firſt year, it will be attended with very little expence, as the flat circular ſpread of its leaves will keep down, or prevent the growth of weeds.

On the failure of turnips, either from the fly, or the black worm, ſome of our farmers have ſown the land with Burnet, and in March following had a fine paſture for ſheep and lambs.

It will perfect its ſeed twice in a ſummer; and this ſeed is ſaid to be as good as oats for horſes; but it is too valuable to be applied to that uſe.

It is ſometimes ſown late in the ſpring with oats and barley, and ſucceeds very well: but we moſtly ſow it ſingly in the beginning of July, when there is a proſpect of rain, on a ſmall piece of land; and in October following, tranſplant it in rows two feet apart, and about a foot diſtant in the rows. This is a proper diſtance, and gives opportunity for hoeing the intervals in the ſucceeding ſpring and ſummer.

After it is fed down with cattle, it ſhould be harrowed clean. Some horſes will not eat it freely at firſt, but in two or three days they are generally very fond of it.

It affords rich pleaſant milk, and in great plenty.

A gentleman farmer near Maidſtone ſome years ſince ſowed four acres, as ſoon as the crop of oats was got off, which was the latter end of Auguſt. He threw in twelve pounds of ſeed per acre, broadcaſt; and no rain falling until the middle of September, the plants did not appear before the latter end of that month. There was however

ever a good crop, and in the ſpring he ſet the plants out with a turnip-hoe, leaving them about a foot diſtant from each other. But I prefer the drill method, as it ſaves more than half the ſeed. The land was a poor dry gravel, not worth three ſhillings an acre for any thing elſe.

The ſevereſt froſt never injures this plant; and the oftener it is fed the thicker are its leaves, which ſpring conſtantly from its root.

With reſpect to the drill huſbandry, it is much on the increaſe with us both in wheat and turnips, and ſucceeds to admiration. Many of our beſt farmers adopt the Norfolk method, and hoe between the rows, which is found ſo advantageous, that it muſt certainly in time make its way over the whole kingdom.

We often ſow turnips between the rows of drilled beans, which ſucceed well, as the beans do not check their growth.

I am, Sir,

Your moſt obedient ſervant,

H. D.

Article XXII.

Cultivation of Madder recommended.

[By a Gentleman in Dorſetſhire.]

Gentlemen,

Being a ſincere friend to your inſtitution, I beg leave to communicate a few thoughts on your premium for the cultivation of Madder; which I think is a very juſt one, for two reaſons:

Firſt; It is certainly conſiſtent with true national policy, to cultivate every thing conſumed either in food or manufactures, to which our ſoil and climate is favourable. And *ſecondly*, becauſe Madder, while it yields a conſiderable profit to the planter, cleans and meliorates the ſoil in a remarkable degree.

The vaſt ſums annually paid to the Dutch for this article, proves the neceſſity, in point of ſound policy, that we are under of raiſing it at home. The too commonly received idea, that we cannot equal the Hollanders in this branch of agriculture, is erroneous. It has indeed been proved totally falſe by the ſucceſsful experiments of Mr. Arbuthnot, who carried it to the greateſt perfection,

fection, with much advantage to himſelf, as well as to the publick.

There is a certain degree of indolence, not to ſay prejudice, among the farmers in general, with reſpect to every thing out of their common line of practice, and eſpecially with reſpect to matters on which trials have been unſucceſsfully made. This has been ſtrikingly diſplayed in the article under conſideration. About ſixteen years ſince, the London Society offered a premium of five pounds an acre, on all lands planted with Madder. This, it was expected, would have rendered the cultivation of it general; but the proper method of raiſing it being then imperfectly underſtood, the experiments of a few perſons failed; and this ſo far diſcouraged others, that little further progreſs was made in this important article of conſumption. The farmers could not, or at leaſt would not, ſee the difference between a crop failing through *improper management*, and through a natural unfitneſs of ſoil or climate, which would in all caſes operate againſt it.

But Mr. ARBUTHNOT was not weak enough to be governed by this miſtaken prejudice. He ſaw what the errors were which had occaſioned ſome of the planters of Madder to be unſucceſsful, and determined to avoid them by undertaking it on a new plan, and proſecuting it with a ſpirit becoming its importance.

The attention he gave to every particular of ſoil, ſituation, ſeaſon, manure, &c. overcame every difficulty, and enabled him to cultivate Madder with great ſucceſs and advantage on ſoils not remarkable for their fertility. The experiments he made are faithfully recorded in Mr. YOUNG's Eaſtern Tour, and I beg leave to recommend them to your conſideration as a Society.

As you have very judiciouſly taken ſome land to make experiments in Agriculture upon, under the direction of your own Committee, I beg leave to propoſe Madder as one object particularly worthy your attention. If you cultivate it on Mr. ARBUTHNOT's plan, I doubt not but you will be equally ſucceſsful; and that your experiments may prove of great utility in ſetting an example to others, which they may probably be induced to follow. I beg your excuſe for this liberty.

And am,
Your moſt obedient ſervant,

Dorſetſhire, J. M.
March 12, 1780.

ARLICLE XXIII.

On the Management of Clay-Lands, and ſome of the Cauſes of the Diſcouragement of Agriculture.

[By a Gentleman Farmer in Eſſex.]

SIR,

I Received your letter, and in anſwer thereto, ſhall give you an account of the beſt method we have in manuring and cropping our very ſtrong or ſtiff clays.

We begin by making a good fallow: What I mean by a good fallow is, to turn in the ſtubble as ſoon after harveſt as an opportunity offers. In the ſucceeding ſummer, plough it four or five times clean, and as deep as the ſoil will admit of; at leaſt ſo deep as to turn up the thiſtle roots, and the ſpear-graſs, that lie in the good ſoil.

The ſecond year ſow barley; the third year make another good ſummer fallow; the fourth year ſow revits, (red lammas wheat;) and in the month of March throw in ten pounds of red clover-ſeed per acre; the fifth year feed it all ſummer with horſes and ſheep; the ſixth year make a good

fallow.

fallow. You will find the pooreſt clays will, by this method of heating them, get better without any manure.

But ſuch clay lands as are well improved, and will bear it, we treat in a different manner. After a good fallow, we ſow barley with clover, and feed the clover till the middle of June; then ſhut out the cattle, and ſeed the clover. At Michaelmas we break it up, and ſow wheat, harrowing the wheat in. Where the clay lands are good, we have found the following courſe of crops for twenty years do very well:—

1ſt *Year,* Fallow
2d, Barley with clover
3d, Clover-ſeed
4th, Wheat
5th, Fallow
6th, Barley
7th, Peaſe, or beans
8th, Wheat
9th, Fallow
10th, Barley and clover
11th, Clover
12th, Wheat
13th, Fallow
14th, Barley
15th, Beans, or peaſe
16th, Wheat
17th, Fallow
18th, Barley
19th, Ditto[†]
20th, Wheat, or barley.

[†] If the land be tired with clover, ſow Tares [Vetches] and feed them.

This courſe of crops I confine only to ſtrong or ſtiff clays. The principal manure we have yet in uſe is town dung, and the dung that ariſes from farm-yards, mixed with earth dug up on the borders or under the hedges. What I wiſh to have underſtood by *clay*, is only ſuch as is well filled with chalk-ſtones, whether large or ſmall. All ſtiff ſoil, without chalk-ſtones, we call loam, or brick earth. Theſe ſoils we mend with clay, and find the greateſt improvement from it.

Now, as it appears to me that your Society have a real deſign to encourage agriculture, I beg their candid attention while I point out a few things by which many of the beſt farmers in our county (and probably in your's alſo) are diſcouraged from making many improvements which might otherwiſe take place.

Firſt; With reſpect to the method of letting farms. Many Noblemen and Gentlemen of large landed property, to ſave themſelves the trouble of examining into the real value of their eſtates, and of letting them properly, employ ſtewards to tranſact this buſineſs with their tenants. It frequently happens that theſe ſtewards are gentlemen brought up to the law, who have never had much opportunity of knowing the value of land by ex-

perience,

perience, and can much better *word a leaſe*, than aſcertain the proper rent of the eſtate.

Theſe ſtewards, therefore, take the opportunity of letting the farms, as a jockey would ſell a horſe; and are always determined by the higheſt bidder. If an experienced farmer will not give them their price, perhaps they find a tradeſman, or a young man eager to get into buſineſs, that will; and it ſignifies little to them who the tenant is, if they can but pleaſe their employers by raiſing the rent. By this means the tenant, having taken his farm too dear, is ſoon ruined, and the farm is again to let.

Sometimes an old tenant, rather than be turned out, will agree to give more rent than he can afford; but after finding he cannot get forward, and is not permitted to leave his farm till the leaſe expires, he leaves off improving it, and makes the beſt he can of it with the leaſt expence. By this means the eſtate itſelf is injured, and many of our uſeful labourers are unemployed, who, for want of work, enliſt into the King's ſervice, and leave their families to be maintained by the pariſh.

I have ſeen divers inſtances, wherein by the induſtry of a family, in the courſe of a leaſe, a farm has been ſo much improved, that the old tenant at the expiration of his leaſe has offered a fourth more rent than he gave before, rather than be turned out; but becauſe he would not ſubmit to give much more rent than he could really afford, to get a decent living for his family, he has been turned out, notwithſtanding he had ſo much improved the eſtate, and the farm let ſo dear to a ſtranger that it has nearly ruined him.

Theſe few things are among the many diſcouragements to improvements in agriculture; and they naturally occaſion a few queries relative to the ſubject.

I would therefore aſk ſuch gentlemen as wiſh to encourage agriculture,

Firſt; Whether it would not be more for the intereſt of thoſe who have eſtates, were they to viſit their tenants themſelves, and to take with them one or more of the moſt active and experienced farmers they can find, whereby they might be well informed whether their eſtates are over-rented or not?

2dly. Whether they are well farmed or not; and if not, to point out to their tenants how they may with advantage to themſelves manage for the better in future?

3*dly*. Whether, where it appears that a tenant is induſtrious and oppreſſed, it would not be more to his own intereſt to encourage him?

4*thly*. I would aſk, with all due ſubmiſſion, whether this would not be more likely to encourage agriculture than the preſent practice of ſcrewing up rents to the higheſt pitch poſſible; or even than in introducing, at a great expence, many very ingeniouſly contrived implements of huſbandry, many of which, though they may amuſe and entertain the curious, are not adapted for uſe to the practical farmer?

I mean not, however, to diſcourage the uſe of ſuch newly-improved implements of huſbandry as are calculated to expedite labour and leſſen expence; but ſuch only as are merely theoretical.

I will juſt add, that we find the watering of meadow and paſture land attended with great advantage, and the cheapeſt amendment we have.

I am, &c.

P——d, Eſſex. * * *

ARTICLE XXIV.

On Watering Meadows.

IT having been a point much diſputed, which is the beſt water for throwing over meadows, that which comes freſh from the ſprings, or that which has run a conſiderable courſe above ground, we give the following extracts from divers letters ſent to the Society on the ſubject, without preſuming ourſelves to determine on the point in diſpute.

I.

I APPREHEND that in moſt of the flat parts of this county hot-ſprings may not abound; and that in places where there are any, their virtue is not known; ſo that the inhabitants (without choice or conſideration, in many inſtances) uſe only that water which has run ſome way, and is become foul by floods. But in the neighbourhood of Chard, and doubtleſs in many other places in the county where the benefit of good ſpring-water is known, it is preferred, and the farmers flood their meadows with it immediately from the ſprings, finding its effects ſo fertilizing as ſufficiently to maintain their meadows in good heart, without any other aid.

Near Taunton. R. P. A.

II.

I SHOULD have anſwered your letter ſooner, but wiſhed to know the opinion of ſome of my friends on the ſubject. On enquiry, I find that their ſentiments coincide with my own; and are as follows:—

That water running from a ſpring, or out of a rock, is often preferred to water from a river that has paſſed ſome way. I apprehend, however, that this is not always the caſe; but ſometimes quite the reverſe. Springs coming immediately from a rock, or from the earth, are, I apprehend, of very different qualities. A ſpring coming from a limeſtone rock, I ſhould think by much the beſt for watering meadows, which is the caſe at Orcheſton in Wilts, where that famous graſs grows,* which produces an amazing crop in thoſe ſeaſons when the meadow can be watered with the ſprings guſhing out of the limeſtone rocks. At other times, when the ſprings are low, the land does not produce more than a third of the quantity.

It is underſtood by the farmers here, that water is very much impoveriſhed by watering a great many meadows on the ſame ſtream; and that thoſe meadows at the head of the ſtream are much the beſt on that account, except where there are a great number of farm-yards draining into it; which, in my opinion, makes up in part at leaſt for the deficiency.

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* See an account of this graſs, vol. i. p. 93.

Maningford. J. A.

III.

WATER ſeldom, if ever, promotes vegetation, unleſs it be in a mixed or heterogeneous ſtate. It is therefore neceſſary, previous to the flooding of meadows, to examine of what nature and quality your water is. All water that paſſes through beds or veins of minerals, or which contains calcarious nitre, copperas, allum, &c. is highly prejudicial to graſs lands. But water that iſſues from chalk cliffs, or limeſtone rocks, or ſand and gravel, is in general friendly. The beſt teſt is its ſoftneſs, which may eaſily be known.

The quantity of water that is let over the land ſhould be in proportion to the nature of the ſoil, and the heat of the ſeaſon. If the ſoil be ſandy, gravelly, or chalky, and the declivity conſiderable, the more water is wanted, and it ſhould remain the longer, eſpecially if the weather be warm, and it be a ſouth aſpect.

If your water has run a long courſe above ground, the fouleſt is the beſt; but that coming immediately from chalk or lime rocks is warmeſt, and much to be preferred to foul muddy water in general. I muſt however obſerve, that water in a ſtate of putrefaction is poiſon to vegetables, and therefore ought never to be uſed for this purpoſe.

S. B.

IV.

Water when carried over meadow-lands after heavy rains, depoſits a fertilizing ſediment, which enriches the ſoil, and turns the mould blackiſh. It alſo promotes the ſpeedy putrefaction of every vegetable and animal ſubſtance found in the earth, and thereby contributes to the melioration of the ſoil under the ſward or turf.

Care ſhould however be taken, that the quantity of water brought on the land be only enough to give vigour to the plants, without overcharging their veſſels. Never water your lands in very hot weather; for when the veſſels of the plants are filled, by the heat cauſing it to aſcend ſuddenly a ſudden cold morning will greatly injure the herbage.

If the ſpring proves dry, paſtures may be watered as ſoon as the froſty ſeaſon is over. But if the winter has been ſevere, and the earth remains moiſt, no current of water ſhould be admitted till the earth is ſettled, and the ſurface becomes dry; for the gentleſt ſtream would carry off the fine mould looſened by the froſt. After the graſs ſhoots, and the ſeaſon becomes mild, water ſparingly. In the ſummer never water but in great drought, nor even then, unleſs the water be perfectly clear and ſweet; for muddy water would render the graſs foul, and give it a bad taſte.

The beſt water is that from clear warm ſprings, and the ſofter the better; but if that cannot be had, brooks which are become foul by running in a muddy channel, will be the next beſt: for a ſtream which continues clear after it has run a conſiderable way above ground, is generally cold, and impregnated with metallic, or mineral particles, both which are deſtructive to vegetation.

J. F.

V.

On the receipt of your letter, I conſulted my meadow floaters, who are unanimouſly of the opinion, that the ſooner the water is thrown over the meadows after it riſes out of the ſprings, the more efficacious it will be.

We have no ſprings on the hills in this part of the country, as in the neighbourhood of Bath; but our meads are full of them, and we apply the water iſſuing therefrom as ſoon as poſſible to the lands. We find ſpring water is better for this purpoſe than river water, on account of its being warmer in winter, and cooler in ſummer.

Ramſbury. W. J.

VI.

I HAVE a range of meads lying nearly on a level by the ſide of a little river, which runs near thirty miles before it reaches my lands. And in the upper part of my meadows a ſpring riſes of very clear ſoft water. Being deſirous of proving which would be moſt beneficial to the land, I have divers times in different years tried both.

In a wet winter, I can eaſily, at flood time, when the river is very foul and muddy, float all my meads by opening the bank by the river ſide. This I have done ſeveral times, and a great deal of ſediment has been left behind on the retiring of the water. In this caſe, I have generally had a large crop of graſe the ſucceeding ſummer, but I have always found it more rank, and the hay leſs ſweet, than at other times.

When I have turned the water of my ſpring over the land, I have found the produce equally great, and the hay much finer and ſweeter than in the other inſtance. I have alſo obſerved, that thoſe meads which firſt received the water from the ſpring, were moſt luxuriant; and thoſe which it ran over laſt the leaſt ſo. I am therefore of the opinion, that the beſt and moſt fertilizing water for meadow land, is that which iſſues immediately from warm ſoft ſprings.

W. M.

The following very ingenious letter on this ſubject we give entire:——

VII.

Dear Sir, *Woolhampton, Jan.* 22, 1783.

I esteem myſelf much honoured by the notice the gentlemen of your Society have been pleaſed to take of my poor, but very willing endeavours to add my mite to promote the views of their very uſeful inſtitution.——To your preſent queſtions, *Firſt*; "What kind of water have you found moſt efficacious?" &c. I anſwer, That which has firſt run a conſiderable way as a brook or rivulet, or rather as a large and rapid river.

I formerly occupied ſome water-meadow not many miles diſtant from this place, where there is a great deal of land watered from the Kennet, a very conſiderable river which riſes at a village of that name not far from Marlborough. The occupiers of thoſe lands are uniformly of opinion, that the more thick, turbid, and feculent, the water is, the greater will be the benefit to be derived from the uſe of it; and the opinion is certainly well ſupported both by reaſon and experience. Haſty ſhowers, and very heavy rains, dilute the manure, and waſh away the fine pulverized earth from the adjacent lands for many miles round; ſo that as the waters increaſe, and become more rapid, they alſo become more replete with fertilizing matter, as is viſible to the eye by the quantity of ſcum, mud, and fine earth, remaining on the ſurface when the water is drawn off. The benefit derived from flooding may in general then be computed, *cæteris paribus*, from the quantity of feculent matter depoſited by the water, for it is, I believe, invariably found to be in proportion thereto.

Secondly; "Is the water of land-ſprings?" &c. I apprehend no certain particular anſwer can be given to this general queſtion.

The effects of the water of land-ſprings muſt depend upon the nature of the ſtrata through which it paſſes, and may be beneficial or otherwiſe to vegetation, as that might be if applied in ſubſtance. Calcarious earths, in general, are friendly and conducive to vegetation; and from thence it ſeems probable, that water iſſuing from limeſtone-rocks would promote the growth of vegetables in proportion to its impregnation by the calcarious matter.

The effects of limeſtone-water have never fallen within my obſervation; but from what I have obſerved of land-ſprings, I have often thought the benefit from them was nothing more than from the ſimple flued as a conſtituent part neceſſary to the accretion of all bodies, abſtracted from every principle of nutriment but what is contained in water as ſuch only.

However, there cannot be a doubt, but different ſprings are impregnated with different qualities, the particulars of which cannot be known but from obſervations of their effects.

Thirdly; "Which ever is preferred, or found beſt, why is it ſo?" &c. The anſwer to the firſt part of this queſtion is contained in the anſwer to the firſt queſtion. It is ſo, becauſe it ſupplies more copiouſly that matter or ſubſtance which is the pabulum, or food of plants, and what is the *material* ſupport of vegetation, without which it would as neceſſarily ceaſe, as an animal would die without food. And,

Fourthly; "What is the *modus operandi* of the benefit ariſing from the floating of meadows?"

Perhaps this queſtion, ſtrictly and philoſophically ſpeaking, is as little capable of a ſatisfactory anſwer, as, What is the eſſence of matter, or that ſubſtance which ſupports its extenſion, ſolidity, figure? &c. That heat and moiſture are the *ſine qua non* of vegetation, is abundantly manifeſt; for it is univerſally certain, that neither ſeeds nor roots, if kept *perfectly* dry, will ever vegetate; and if kept wet without heat, they corrupt and rot, but never grow.

Heat and moiſture, therefore, are two univerſal agents indiſpenſably neceſſary to the life and growth of plants; but how far either or both ſupply the principles or material ſubſtance which cauſes the accretion, and increaſe of bulk and ſize, or by what mode of operation it derives principles from dead, inert, ſtinking, corrupted, and impure ſubſtances, and converts them into parts of living organized bodies, which charm the ſight, the ſmell, and the taſte of animals, and furniſh aliment for their comfortable ſubſiſtence, is perhaps beyond the utmoſt ſtretch of human underſtanding to conceive.

It is in every one's experience, that the excrements, and corrupted ſubſtances of animals, when properly digeſted, are the moſt powerful promoters of vegetation; and plants ſo produced become the wholeſome and neceſſary ſupport and food of man: So that what was laſt year a poiſonous, putrid maſs, is this, by the wonderful chemiſtry of nature, and a rapid circulation thro' a ſyſtem of organized bodies, converted into a ſubſtance endued with life, ſenſation, &c. If that ſhould be doubted, they certainly are neceſſary to the ſupport of life, ſenſation, &c. And perhaps it is not a jot more conceivable how a poiſonous, putrid ſubſtance ſhould be converted into wholſome nouriſhment for the ſupport of living animal ſubſtance, than it is for the former to be converted into the latter; that is, a dead inert ſubſtance into a living and active one.

By creation is commonly meant the production of ſomething out of nothing; or the calling of ſomething into being which had no exiſtence before. But by propagation and generation, is meant the exiſtence of ſome being as derived from another. But is ſuch generation any thing more than a real tranſmutation of one thing into another? Every cherry-ſtone virtually contains in it more of thoſe trees, and of that fruit, than ever exiſted together at any one time in the world. Is it impoſſible to conceive, that the ſeminal principle of the kernel ſubſtantially contains ſuch an infinity? What then, but extraneous matter, under a very different heterogeneous form, being circulated through a ſyſtem of pipes of organized matter, can produce ſuch an infinite number, and immenſe magnitude, of any claſs of living beings, from a principle originally too minute to be viſible to the eye?

The earth may be conceived to be the matrix of vegetation: and the huſbandman certainly knows from experience, that by impregnating it with certain ſubſtances, by laying them upon it at proper ſeaſons, a ſoil naturally ſterile may be rendered fertile. So a meadow floated with water, copiouſly abounding with putreſcent particles, and ſubſtances impregnated therewith, would infallibly be benefited thereby; the *modus operandi* of which may literally, though in a groſs ſenſe, be certainly imputed to the action of the fertilizing matter depoſited by the water in the form of an unctuous ſediment, in the ſame manner as all lands are benefited or improved by the acceſſion of manure, by whatever means it is depoſited there.

I am, dear Sir,
With great reſpect and eſteem,
Your moſt humble ſervant,
JOS. WIMPEY.

ARTICLE XXV.

On Rearing Calves without Milk.

SIR, *H——l, April 24, 1783.*

LOOKING into the premiums offered by the Society this year, I find the eighteenth is a Silver Cup, value ſix guineas, to the farmer, who, from January 1783 to January 1784, ſhall rear the greateſt number of calves, not leſs than five, without milk; and who ſhall diſcover to the Society the beſt and cheapeſt method of ſo rearing them.

Such

Such a diſcovery being a deſideratum in huſbandry, and valuable as a likely means of cauſing a greater tnumber of thoſe profitable animals to be annually reared; I have lately, I hope, been furniſhed with that information, which will bid fair fully to attain the end propoſed, as much from the very great facility of the practice, as from the cheapneſs of it.

Riding out a few weeks ago, I accidentally paſſed through a turnip-field, in the occupation of a tenant of mine, in Wreningham, (a pariſh adjoining to this) where ſeeing ſeveral fine healthy weanling calves of this year, I enquired of him, who then happened to be there, how long they had been turned into the field, and whether they were left abroad during the night; when he gave me the following account:—

" That his method was, and had been for many years, to wean his calves from ſucking the cows at about ſeven or eight days old; that he then gave them ſkimmed milk for about ten or twelve days more, with a few turnips cut into three or four pieces each, which they ſoon learnt to nibble and eat; after which he turned them into the turnip-field without any farther care or trouble than carrying them a ſmall bunch of freſh barley or oat ſtraw, night and morning, which he always obſerved to lay under ſuch hedge of the field as was then moſt ſheltered from the wind; that he turned them out in any month, in January, or ſooner or later, as they happened to be calved; that he never loſt any of them, never had any of them louſy, or that ſeemed to require more care or attention about them."

This practice was ſo different from my own, and that of moſt of my neighbours, that I enquired of ſome of them into the truth of it, when they all aſſured me, that the fact was as I have repreſented, although they had not the courage to follow his example; and that this man had learned the practice from a former tenant of mine who lived in this pariſh, and did the ſame, with this difference only, that he uſed to carry to his calves, whilſt in the turnip-field, a quantity of chopped ſtraw of either barley or oats, which he gave them in a trough night and morning until they went to graſs.

I cannot, upon the joint teſtimony of theſe people, have any doubt of the truth of theſe facts; and admitting them therefore to be true, there cannot, I conceive, be any method of rearing calves attended with either leſs trouble or leſs expence to their owners, and which deſerves to be more generally known.

I am, Sir, your moſt humble ſervant,

T. B.

Article XXVI.

On the amazing Increaſe Grain is capable of, from dividing and tranſplanting its Roots.

Sir,

I TAKE the liberty of writing to you as Secretary to the Bath Society for the encouragement of Agriculture. Having this day with great pleaſure peruſed the publication of their firſt volume of letters and papers, I am impelled to throw in my mite, by communicating an idea, with which I am moſt forcibly impreſſed.

If you will take the trouble to refer to the Annual Regiſter for 1769, you will find, under the head of uſeful projects, a paper extracted from the Philoſophical Tranſactions, giving an account of an experiment made by Mr. Charles Miller of Cambridge, on the increaſe of a ſingle grain of Wheat in one ſeaſon. It was communicated by Dr. Watson, of Lincoln's-inn-fields.

I have applied to the Doctor to know if the experiment was made on a larger ſcale the ſucceeding year, as was propoſed? He informed me, "that he believed it was not; that Mr. MILLER "went to India ſoon after that experiment, and "that he knew nothing more on the ſubject than "has been publiſhed in the Philoſophical Tranſ- "actions."

Mr. MILLER has been employed by the India Company to make reſearches into the Botany of the Eaſt; and I am perſuaded the reſult will be very entertaining to ſuch Botaniſts as delight in the ſtudy of exotics; but I will venture to affirm, that the ſingle experiment upon the grain of wheat (if properly attended to) will prove of more real and intrinſic value to this country than all the exotics, or than all the knowledge of exotics, he can poſſibly import.

I am fully ſenſible, that the expence and labour of ſetting wheat, in the manner as deſcribed in that paper, will render it impracticable in common uſe; but I ſtill think it is a moſt important and valuable diſcovery, and that it merits the utmoſt degree of the attention of ſuch a patriotic and public-ſpirited Society as is eſtabliſhed at Bath.

One ſingle grain of wheat produced in one ſeaſon, in weight forty-ſeven pounds,
in meaſure $3\frac{3}{4}$ pecks,
in number 570,000-fold!

What an aſtoniſhing increaſe! What a power of fecundity! What an incredible diviſibility, almoſt *ad in finitum*, are all hereby laid open!

I am now inclined to believe, after this diſcovery, it may be found, that wheat may be produced from a fibre of the root, as well as from a plant. I am not a farmer; I never had the direction of a plough; but I will make the experiment, to try what is the ſmalleſt portion of a plant of wheat that can be made to produce grain.

Mr. Miller, after having made the diſcovery, was ſatisfied with publiſhing it; but I promiſe you, if I am ſo happy as to make any new diſcovery upon the ſubject, I will not (like him) leave it to others to point out how, or in what manner, it can be applied to publick utility.

But I forget myſelf. I am giving up facts, and following conjectures. I will therefore return to the original intention of my letter, which is, to excite the attention of your Society to this wonderful diſcovery of Mr. MILLER's, in hopes that, under your patronage and protection, it may be rendered uſeful to the improvement of huſbandry.

By this experiment, we have obtained the moſt clear and inconteſtible proof of the fecundity and diviſibility of wheat; it therefore remains, to follow the moſt probable means, the means that may bid the faireſt for improving upon this principle, and making it applicable to the practice of farming. I agree with the Author who begins your Appendix, "that nothing can be expected "from it in the hands of common farmers;" from them we ſhall have, "*It may be ſo, but I don't* "*know.*" But from ſuch a Society as your's, I expect every thing.

Where men poſſeſs liberal ideas, and a great ſhare of publick ſpirit, it cannot be ſuppoſed they will deſpiſe a hint, and treat it with contempt, merely becauſe it is ſuggeſted to them by a perſon who is not a farmer by profeſſion: I may indeed ſay, not even in theory, for I never read any book on the ſubject of agriculture, excepting that of the Bath Society. But within this month, I have become ſuch an enthuſiaſt in the doctrine and principles of the diviſibility of grain, after it is ſprung up, that I can think upon no other ſubject; and ſince my converſion to this doctrine, I have been at the pains to procure ſome information from practical farmers, in hopes thereby to enlarge the very narrow and contracted circle of ideas I have on that ſubject.

I have learned from them, that it is not unuſual in ſome parts of the country, for the farmers to harrow their fields after the grain is ſprung up. In Norfolk, they harrow their ſummer corn, but not their wheat. In Eſſex, they harrow their wheat, but not their ſummer corn.

Upon inveſtigating the principles upon which theſe practices are founded, I found them confined merely to that of pulverizing the earth, without any attention to Mr. Miller's doctrine: they ſaid, "that after very heavy rains, and then "exceſſive dry weather, the ſurface of their lands "was apt to be caked, the tender fibres of the "young roots were thereby prevented from puſhing, and of courſe, the vegetation was greatly "obſtructed; in ſuch inſtances, they found very "great benefit from harrowing and rolling."

My own reaſon tells me *their* principles are well founded, ſo far as relates to pulverizing; but I contend, that the benefit ariſing from harrowing and rolling is not derived from pulverizing entirely, but alſo from ſubdividing.[*] and enabling the plants to tiller, (as I believe it is termed.) The harrow certainly breaks the incruſtation on the ſurface, and the roller crumbles the clods; but it is alſo obvious, that the harrow removes a great many of the plants from their original ſtations; and that if the corn has begun to tiller at the time it is uſed, the roots will be, in many inſtances, ſubdivided, and then the application of my ſyſtem of diviſibility comes into play. The roller then ſerves to plant the roots, which have been torn up by the harrow.

Such is my enthuſiaſm, that I am induced to eſtabliſh this hypotheſis, and leave it to the conſideration

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[*] We doubt not the good effects of harrowing and rolling both wheat and ſummer corn, for the very good reaſons given by the Norfolk and Eſſex farmers for their practice. But we apprehend, that with reſpect to the harrows dividing the roots of the plants when they begin to *tiller*, our ingenious correſpondent is too ſanguine in his expectations. The teeth of a harrow are too large and blunt to divide roots ſo ſmall and tenacious as are thoſe of grain; and whenever ſuch roots (however tillered) ſtand in the line any tooth makes, they will, if ſmall, be only turned on one ſide by the earth yielding to their lateral preſſure, or if large, the whole root will probably be drawn out of the ground. In our opinion, therefore, the principal uſes derived from harrowing and rolling theſe crops are, opening the ſoil between the plants, earthing them up, breaking the clods, and cloſing the earth about their roots.

ſideration of gentlemen who are converſant both in the theory and practice of agriculture.

It is true, indeed, that many ſyſtems, which make a good figure in theory, fall to the ground when reduced into practice, and are put to the teſt by the auſtere hand of experiment.

I hope, in the preſent inſtance, that will not be the caſe. My argument is founded upon analogy, upon parity of reaſoning. One grain of wheat is capable of producing, in one ſeaſon, one buſhel; [Mr. Miller, indeed, inſinuates, that it might have been greater;] one hundred grains then contain the capability of producing a larger crop than ever was reaped from one acre.

But it will be objected to me, that Mr. Miller's practice cannot be extended to a large ſcale. I allow it; not by the hand, I mean; but I will not give up the harrow and roller, until ſome better implements are invented.

In common, it is not a very material object to ſave a proportion of the ſeed corn; becauſe probably it can only be done by increaſing the labour, which may greatly overbalance the value of the ſeed to be ſaved.* This ſeaſon, however, it becomes an object of the greateſt importance; in the Northern parts of this kingdom, there is a very great ſcarcity of corn fit for ſeed; the harveſt was ſo late that the corn did not ripen, and of courſe, a great deal of bad ſeed will be reaped; if ſo, when the corn ſprings, it muſt be very thin, puny, and probably diſeaſed. This then is the æra for applying the harrow and roller to great advantage, upon fields which are not very promiſing. If the farmer is ſatisfied with the appearance of his crop, after it is ſprung, I do not preſcribe—it is only when people are ſick that they apply to a doctor.

I do not preſume to recommend any thing more at preſent, than the uſe of the harrow and roller, from which the farmers in Norfolk and in Eſſex derive ſo much advantage. (They may be uſed in many other counties, but it is not yet come to my knowledge.) I will, however, venture to recommend a repetition of them; that is to ſay, if great advantage is obſerved on harrowing and rolling once, that ſometime afterwards, when the roots have had time to ſtrike into the earth, and the corn to tiller, it ſhould be again harrowed and rolled; and if good effects are obſerved from that alſo, that it ſhould even be repeated a third time. I recommend it upon the following principle: That Mr. MILLER's experiment demonſtrates how difficult it might be to eradicate corn by harrowing; ſhould nine plants be deſtroyed by the harrow, it is probable, that the tenth will do more than ſupply the deficiency.

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* This is not the caſe in drilling; the extra expence is much more than ſaved in the ſeed.

I come now to conclude, with the following maxims:——

Firſt; That this diſcovery of Mr. MILLER's is highly meritorious, and deſerves the attention of your Society, and of every Society for the improvement of Agriculture, as well as of every Farmer in the world.

2dly; That every farmer who practiſes harrowing and rolling, ſhould pay particular attention, in the moſt minute manner, to the effect it has on the corn; and to obſerve particularly, whether in his judgment the benefit ariſes from the pulverizing, or the tillering, or from both:—that he ſhould aſcertain by experiments on certain portions of his lands, accurately meaſured, the difference in the produce of what is not harrowed and rolled, and what is done once, and (if he chooſes it) let him try it the ſecond, third, and even the fourth time. Upon a ſmall ſcale, the loſs cannot be great, even although the repetition ſhould not ſucceed; but if it ſhould anſwer, the diſcovery may be very important, perhaps more ſo than any that has been made in agriculture for this century.

3dly; That if the ideas of the Bath Society ſhould coincide with mine upon this ſubject, they ought to take the moſt ſpeedy and effectual meaſures to make their approbation publick, ſo as that the practice of harrowing and rolling corn after it is ſprung, may thereby the ſooner become general; and that they ſhould invite every perſon who may have already followed that practice, or who may do it in future, to communicate to *them* their experiments, their obſervations, and their opinions, of the advantages or diſadvantages reſulting therefrom.

4thly; That they ſhould alſo invite ſome of the moſt ingenious Botaniſts to follow up the experiment, ſo ſucceſsfully begun by Mr. MILLER upon wheat, and alſo to extend it to oats, barley, rye, buck-wheat, &c. &c.

5thly; That as it is very material to know the moſt proper time to harrow and roll corn, in reſpect to its age, or its height, as well as in reſpect to the ſeaſons, whether in wet or dry weather; meaſures to procure information on thoſe heads ſhould be adopted.

6thly, and *laſtly*; That as the knowledge of the particular ſorts of harrows and rollers now in uſe for this operation may be material, meaſures ſhould alſo be taken to procure information on that head. And farther, that, as it is very probable great improvement may be made in regard to implements fit for this operation, conſiderable premiums ſhould be offered to the inventors of ſuch as may be found on trial to be the beſt adapted for this purpoſe.

I have the honour to be, Sir,

Your moſt obedient ſervant,

London, April 20, 1783. R. B.

N. B. As the experiment referred to was very extraordinary, we ſhall give an abſtract of the account, as publiſhed in the Philoſophical Tranſactions for the year 1768.

ON the 2d of June 1766, Mr. C. MILLER ſowed ſome grains of the common red wheat, and on the 8th of Auguſt a ſingle plant was taken up and ſeparated into eighteen parts, and each part planted ſeparately; theſe plants having puſhed out ſeveral ſide-ſhoots, by about the middle of September ſome of them were then taken up and divided, and the reſt of them, between that time and the middle of October; this ſecond diviſion produced ſixty-ſeven plants. Theſe plants remained thro' the winter, and another diviſion of them, made between the middle of March and the 12th of April, produced five hundred plants. They were then divided no further, but permitted to remain. The plants were in general ſtronger than any of the wheat in the fields. Some of them produced upwards of one hundred ears from a ſingle root. Many of the ears meaſured ſeven inches in length, and contained between ſixty and ſeventy grains.

The whole number of ears which, by the proceſs above-mentioned, were produced from one grain of wheat, was 21,109, which yielded three pecks and three quarters of clear corn, the weight of which was 47lb. 7oz.; and from a calculation made by counting the number of grains in an ounce, the whole number of grains was about 576,840.

By this account we find, that there was only one general diviſion of the plants made in the ſpring.

Had

Had a ſecond been made, Mr. MILLER thinks the number of plants would have amounted to 2000 inſtead of 500, and the produce thereby much enlarged.

The ground was a light blackiſh ſoil, upon a gravelly bottom, and conſequently a bad ſoil for wheat. One half of the ground was well dunged, the other half had no manure. There was however not any difference diſcoverable in the vigour, or growth, or produce, of the plants.

ARTICLE XXVII.

On the Quantity of Seed-Grain unneceſſarily ſown in the Broadcaſt Method.

[By a Gentleman Farmer in Hertfordſhire.]

GENTLEMEN,

THE obliging notice you took of my former letter encourages me to addreſs you a ſecond time, but on a different ſubject; to wit, that of the quantity of ſeed-grain unneceſſarily ſown in the broadcaſt method. This is too much overlooked by farmers in general, who, though when told of it, admit the fact, yet neither it ſee nor its conſequences in their full magnitude.

When the ſeed is to be prepared or carried to the land for ſowing, they too generally think that the more they ſow the more they ſhall reap; and therefore, in moſt places, are at double the expence for ſeed grain which they need to be, without making any further calculation than that of the difference of value between ſix and ten pecks per acre, on the ſingle field they are about to ſow.

One reaſon for this may be, that the farmers' ſeed grain being their own growing, they conſider it as the old woman did her flour, when ſhe calculated the coſt of her mutton-pies, and overlook its real value. *The flour is my own*, ſaid ſhe; *the ſeed is my own*, ſays the farmer, and therefore I won't ſtarve the crop.

But if large farmers would be at the trouble of calculating the value of what they unneceſſarily ſow on two or three hundred acres of arable land, the amount would aſtoniſh them; for it is really aſtoniſhing, and an object of very great national importance; indeed ſo great, that I am of the opinion the Parliament would be wiſely employed in inſtituting a Board of Agriculture, to regulate this and other abuſes of the art.

It is a certain fact, that double the neceſſary quantity of ſeed-grain is annually thrown away; which, upon a moderate calculation, would feed near an eighth part of the inhabitants of this kingdom. This of courſe advances the price of what remains one-eighth;—a heavy tax indeed on the poor, and a very fooliſh one, becauſe it anſwers no good end.

One of the great advantages of the Drill Huſbandry is the ſaving of ſeed: but from a variety of cauſes, ſome real ones in local ſituations, and many imaginary ones, it is not probable it will, in our time, be univerſally adopted. It however affords a profitable leſſon to thoſe who do not practiſe it. They are thereby convinced, that a much leſs quantity of ſeed than they have been accuſtomed to ſow is ſufficient. This has operated on ſome intelligent farmers, who ſtill continue in the broadcaſt method.

Some of them have taken the hint, and leſſened the quantity of their ſeed: their crops have been equally good or better than before. In time, perhaps, their practice may be generally better regulated. It is an event much to be wiſhed, and I think it an object worthy your ſtrongeſt recommendation.

I am not ignorant that no certain ſtandard can be fixed for the quantity of grain which ought to be ſown per acre: this muſt differ as the circumſtances differ that attend it. The ſoil, the ſeaſon, the ſtate of the land, and the ſize of the grain, require more or leſs, as theſe are different.

For inſtance, Wheat: a very rich fertile ſoil, in good tilth, requires leſs ſeed by one-third than a poor hungry one: this may appear paradoxical to thoſe who do not reaſon on the matter. They will ſay it is unreaſonable to ſuppoſe a poor ſoil will ſupport a greater crop:—Granted; but I make no ſuch ſuppoſition. The caſe is this: in a rich fertile ſoil every root produces much the greateſt number of ſtalks, perhaps ten or twenty; while thoſe in a poor ſoil have only two or three. In the one caſe, if you ſow more ſeed, the ground will be overſtocked with plants, which will draw each other up weak, and produce much ſtraw indeed, but little corn. In the other caſe, if you ſow only the ſame quantity of ſeed on poor land, it will be underſtocked, and the crop ſmall. For if, through the poverty of the ſoil, a root of wheat cannot extend its ſide fibres more than two or three inches round, what good purpoſe can it anſwer to have them a foot apart? Half the ground is loſt. Hence it follows, that a double quantity of ſeed is wanted on poor land;—and therefore, that on ſuch land the broadcaſt mode of ſowing is preferable to drilling.

It appears clearly evident to me, that on ſuch land two buſhels, or even ten pecks of wheat, and three buſhels of barley, and four of oats, may be neceſſary. But on a rich fertile ſoil, well prepared, half the quantity is fully ſufficient, and will produce a better crop. Every one who attends to the growth of plants, knows that they require a competent diſtance to arrive at perfection.—Every gardener is perfectly acquainted with this, and acts accordingly. Why then are farmers ſo abſurd as to think the ſame management is not equally neceſſary in a field, which is only a large garden? This muſt be only long-rooted prejudice: for corn of all kinds muſt have ſufficient room according to its ſize, or you deprive it of the advantages which nature affords, by excluding the ſun and the freſh air from the bottom of the plants, which are ſo neceſſary to their perfection; and inſtead of corn, get only a great burden of ſtraw.

With reſpect to ſowing wheat, the quantity of ſeed ſhould be porportioned to the ſeaſon. If you ſow in September, *a third leſs* will do than when ſown in November or December, becauſe more of the ſeed miſcarries in that unfavourable ſeaſon.

I am, Gentlemen,

Your's, &c.

X. Y. Z.

ARTICLE XXVIII.

On the Nature and Effects of Lime as a Manure.

[From a Gentleman in Devonſhire.]

GENTLEMEN,

AS you are about to oblige the publick with a ſecond volume of your valuable papers on Agriculture, I hope you will not deem it impertinent in me to throw a few hints before you on the nature and effects of lime as a manure for land: they are the united effects of my own experiments and obſervations on the ſubject; and the opportunities I have had for forming my opinion have been many and various.

The county of Devon has been reproached by ſome writers as being a century behind moſt counties in England in Agricultural improvements.

That the farmers in general here have been very dilatory in diſcovering, and even adopting, new improvements therein, is too true; but with reſpect to the nature and uſe of lime, they appear to underſtand it as well as the farmers of any county whatever. This may furniſh ſome apology for my troubling you with the following remarks.

Lime, like moſt other manures, has been uſed in different places, and by different perſons, with various ſucceſs: ſome have declared they never could reap any benefit from its uſe; but a far greater number have found its effects very beneficial, indeed more ſo than any other manure.

But the great error of thoſe who diſclaim the uſe of lime has been, that of uſing it on all kinds of land without diſtinction; vainly expecting the effects would be equally advantageous in all caſes. But while it has proved a very uſeful good dreſſing to ſome lands, it has rendered others leſs fertile; and in ſuch caſes the whole expence has been thrown away.

In ſome parts of this county, a good manuring with lime has coſt the farmer near four pounds an acre. It muſt be a better crop of wheat than they get in common to anſwer that expence; their profit therefore muſt ariſe from the ſucceeding crops.

Experience teaches that lime ſtrongly attracts and abſorbs moiſture, and is itſelf ſoluble in it. In common with all abſorbent earths, it alſo attracts oil and acids.

The moſt rational theory therefore is, that its virtue conſiſts not in itſelf, but in its action and powers of attraction. By attracting the moiſture of the air, and the oils that are floating therein, and in the earth alſo, and reducing the buried roots, vegetables, moſs, &c. which it happens to be mixed with, into a ſaponaceous mucilage, which is of a very nutritive quality; it combines thoſe ſubſtances which of themſelves would never unite, ſuch as oil and water, which it forms into a ſmooth conſiſtent fluid.

Hence it appears, that lime ought not to be uſed alone, except where there is plenty of vegetable or animal ſubſtances for it to act upon. When theſe are wanting, mix it up with rotten dung; for without theſe it will, in many caſes, exhauſt the ſoil of its moſt fertile juices and particles, and leave it in a barren ſtate. Where there is plenty of vegetable or animal ſubſtances for it to act upon, lime may be uſed to conſiderable advantage; and alſo on land overrun with weeds, as it kills and converts them into good manure. But on exhauſted, or very poor land, the expence of liming will never be repaid.

The learned and ingenious Dr. ALSTON obſerves of lime, that if long expoſed to the air, it ſoon loſes its medicinal virtue, its virtue as a manure, and as a cement in building; but that if ſlaked with water, it retains theſe virtues a long time. The practice of the Devonſhire farmers correſponds with this doctrine.

After their lime is laid in ſmall heaps on the land, they cover it with earth till the coat is thick enough to ſecure it from air and rain; and in order to prevent thoſe from entering, they beat the outſide of the heaps ſmooth with their ſhovels. The moiſture of the earth gently ſlakes this lime, and the heaps remain in this ſtate until the land is ready for its ſpreading.

Another method of mixing up their lime is uſed by the beſt farmers, which adds greatly to the fertility of the land dreſſed with it. This method is to form heaps of earth and lime as above deſcribed, and when theſe are well incorporated, to open the heaps and bury in each as much good farm-yard dung as it will cover.

The dung being thus covered up will ſoon ferment and diſſolve; and after laying a proper time, the maſs being chopped together with the ſpade, forms a ſoapy mucilaginous manure of the moſt fertilizing nature. Uſed in this manner, lime will always be exceedingly profitable. But the reaſon of its being reprobated in ſome other counties is, that they know not how to (or will not) apply it properly. Their method is to ſpread it on the land as they do chalk, and let it lie there till rain or the moiſture of the air ſlakes, and occaſions it to fall in pieces. But by being thus expoſed to the air, its virtue, which ſhould promote vegetation, is all evaporated, and of courſe its uſe as a fertilizing manure is totally loſt.

I am, your's, &c.

C. H.

ARTICLE XXIX.

On the Nature of different kinds of Soil, and the Grain, Pulſe, or Graſſes, proper to each.

GENTLEMEN,

AS the publication of your firſt volume of ſelect papers did you honour as a Society, and furniſhed the publick with a variety of uſeful information, it gave me pleaſure to ſee, in the advertiſement of your annual meeting, that a ſecond volume was nearly ready for the preſs. And as you ſeem deſirous to obtain the correſpondence of thoſe who have had ſome experience, and poſſeſs ſome knowledge in the arts of cultivation, I am willing to contribute my mite in this way.

Agriculture, Planting, &c. have been my employment, ſtudy, and amuſement, near forty years; and as I have kept regular minutes of the experiments I made, they have ſupplied me with conſiderable inſtruction.

I therefore beg leave to trouble you with a few brief remarks on the nature of different ſoils, and the crops moſt likely to ſucceed on each reſpectively.

Firſt. Clay, which is in general the ſtiffeſt of all ſoils, and contains an unctuous quality. But under the term clays, earths of different ſorts and colours are included. One kind is ſo obſtinate, that ſcarcely any thing will ſubdue; another ſo hungry and poor, that it abſorbs whatever is applied, and turns it into its own quality. Some clays are fatter than others, and the fatteſt are the beſt; ſome are more ſoft and ſlippery: but all of them retain water poured on their ſurfaces, where it ſtagnates, and chills the plants, without ſinking into the ſoil. The cloſeneſs of clay prevents the roots and fibres of plants from ſpreading in ſearch of nouriſhment. The blue, the red, and the white clay, if ſtrong, are unfavourable to vegetation. The ſtony and looſer ſorts are leſs ſo; but none of them are worth any thing till their texture is ſo looſened by a mixture of other ſubſtances, and opened, as to admit the influence of the ſun, the air, and froſts. Among the manures recommended for clay, ſand is of all others to be preferred; and ſea-ſand the beſt of all where it can be obtained: this moſt effectually breaks the coheſion.

The reaſon for preferring ſea-ſand is, that it is not formed wholly (as moſt other ſands are) of ſmall ſtones; but contains a great deal of calcarious matter in it, ſuch as, ſhells grated and broken to pieces by the tide; and alſo of ſalts. The ſmaller the ſand is, the more eaſily it penetrates the clay; but it abides leſs time in it than the larger.

The next beſt ſand is that waſhed down by rains on gravelly ſoils. Thoſe which are dry and light are the worſt. Small gritty gravel has alſo been recommended by the beſt writers on Agriculture for theſe ſoils; and in many inſtances I have found them to anſwer the purpoſe.

Shells, marle, aſhes, and all animal and vegetable ſubſtances, are very good manures for clay; but they have been found moſt beneficial when ſand is mixed with them. Lime has been often uſed, but I would not recommend it, for I never found any advantage from it ſingly, when applied to clays.

The crops moſt ſuitable for ſuch lands are, wheat, beans, cabbages, and rye-graſs. Clover ſeldom ſucceeds, nor indeed any plants whoſe roots require depth, and a wide ſpread in the earth.

2dly. Chalk.—Chalky ſoils are generally dry and warm, and, if there be a tolerable depth of mould, fruitful; producing great crops of barley, rye, peaſe, vetches, clover, trefoil, burnet, and particularly ſainfoin. The latter plant flouriſhes in a chalky ſoil better than any other. But if the ſurface of mould be very thin, this ſoil requires good manuring with clay, marle, loam, or dung. As theſe lands are dry, they may be ſown earlier than others.

When your barley is three inches high, throw in 10lb. of clover, or 15lb. of trefoil, and roll it well. The next ſummer mow the crop for hay; feed off the aftermath with ſheep; and in winter give it a top-dreſſing of dung. This will produce a crop the ſecond ſpring, which ſhould be cut for hay. As ſoon as this crop is carried off, plough up the land, and in the beginning of September ſow three buſhels of rye per acre, either to feed off with ſheep in the ſpring, or to ſtand for harveſt. If you feed it off, ſow winter vetches in Auguſt or September, and make them into hay the following ſummer: then get the land into as fine tilth as poſſible, and ſow it with ſainfoin, which, with a little manure once in two or three years, will remain and produce good crops for twenty years together.

3dly. Light poor land, which ſeldom produces good crops of any thing till well manured. After

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it is well ploughed, ſow three buſhels of buckwheat per acre, in April or May: when in bloom, let in your cattle a few days to eat off the beſt, and tread the other down; this done, plough in what remains immediately, This will ſoon ferment and rot in the ground; then lay it fine, and ſow three buſhels of rye per acre. If this can be got off early enough, ſow turnips; if not, winter vetches to cut for hay. Then get it in good tilth, and ſow turnip-rooted cabbages, in rows three feet apart. This plant ſeldom fails, if it has ſufficient room, and the intervals be well horſe-hoed; and you will find it the beſt ſpring-feed for ſheep when turnips are over.

The horſe-hoeing will clean and prepare the land for ſainfoin; for the ſowing of which I reckon April the beſt ſeaſon. The uſual way is to ſow it broadcaſt, four buſhels to an acre; but I prefer ſowing it in drills too feet aſunder; for then it may be horſe-hoed, and half the ſeed will be ſufficient. The horſe-hoeing will not only clean the crop, but earth up the plants, and render them more luxuriant and laſting. If you ſow it broadcaſt, give it a top-dreſſing in December or January, of rotten dung, or aſhes, or, which I think ſtill better, of both, mixed up in compoſt.

From various trials, I find that taking only one crop in a year, and feeding the after-growth, is better than to mow it twice. Cut it as ſoon as it is in full bloom, if the weather will permit. The hay will be the ſweeter, and the ſtrength of the plants leſs impaired, than if it ſtands till the ſeed is formed.

4thly. Light rich land, being the moſt eaſy to cultivate to advantage, and capable of bearing moſt kinds of grain, pulſe, and herbage; I ſhall ſay little upon it. One thing however is very proper to be obſerved, that ſuch lands are the beſt adapted to the drill-huſbandry, eſpecially where machines are uſed, which require ſhallow furrows to be made for the reception of the ſeed. This, if not prone to couch-graſs, is the beſt of all ſoils for lucerne; which, if ſown in two-feet drills, and kept clean, will yield an aſtoniſhing quantity of the moſt excellent herbage. But I am convinced lucerne will never be cultivated to advantage, where couch graſs and weeds are very plentiful; nor in the broadcaſt method, even where they are not ſo; becauſe horſe-hoeing is eſſential to the vigorous growth of this plant.

5thly. Coarſe rough land:—Plough deep in autumn; when it has lain two weeks, croſs-plough it, and let it lie rough through the winter. In March give it another good ploughing; drag, rake, and harrow it well, to get out the rubbiſh, and ſow four buſhels of black oats per acre if the ſoil be wet, and white oats if dry. When about four inches high, roll them well after a ſhower: This will break the clods; and the fine mould falling among the roots of the plants will promote their growth greatly.

Some ſow clover and ray-graſs among the oats, but I think it is bad huſbandry. If you deſign it for clover, ſow it ſingle, and let a coat of dung be laid on in December. The ſnow and rain will then dilute its ſalts and oil, and carry them down among the roots of the plants. This is far better than mixing the crops on ſuch land; for the oats will exhauſt the ſoil ſo much, that the clover will be impoveriſhed. The following ſummer you will have a good crop of clover, which cut once, and feed the after-growth. In the winter plough it in, and let it lie till February: then plough and harrow it well; and in March, if the ſoil be moiſt, plant beans in drills of three feet, to admit the horſe-hoe freely. When you horſe-hoe them a ſecond time, ſow a row of turnips in each interval, and they will ſucceed very well. But if the land be ſtrong enough for ſowing wheat as ſoon as the beans are off, the turnips may be omitted. I am, your's, &c.

B—— S——d, Herts, B. K.
May 14, 1782.

ARTICLE XXX.

The Value of Carrots aſcertained;—with ſome Obſervations on the Premiums offered by the Society in 1782.

GENTLEMEN,

HAVING given a recital of my trial of carrots in a preceding letter, I ſhall at preſent confine myſelf to the point of aſcertaining their value, which I have already obſerved to be ſo undecided a queſtion.

Among other uſes, my crop of 1780 was applied partly to finiſhing the fatting of ſome wether lambs, that had had the ſummer's graſs. I had twenty-ſix of them which ought to have been fat at Michaelmas, but my food coming ſhort, they were not in the autumn ſaleable to a butcher. I had ſome confidence in carrots, but I wanted them for my horſes, and I tried various butchers

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as well as dealers to get rid of my ſheep, but could not. I had given 6s. 6d. each for them in September 1779, and yet was offered no more for them than 10s. I determined therefore to put them to carrots.

Nov. 4, 1780, I incloſed a pen with hurdles on a dry meadow, put the ſheep in, and ſupplied them with carrots, moving the hurdles on as they ſoiled the ground ſo as to make it too dirty to eat upon; but as the improvement of the land was one object, being moſſy and hide-bound, I did not ſhift them 'till the graſs was quite black with their dung, and much better folded than is ever done in the common way.

'Till the 21ſt, they ate no more than two buſhels (weight 56lb. each) a day. I then find from my minutes that they ate three 'till the 25th, and by the 28th they had got to ſix; but ſome days they ate eight, and even ten; in others only five were given, to make them eat clean. By the 16th of December, the quantity was pretty regularly five a day. But I found upon an average of the whole experiment, that the quantity might in a general way be reckoned at four buſhels a day feeding twenty lambs. They weighed alive at putting to carrots 100lb. each.

April 3d, they were all ſold and killed fat.

10 of them ſold at	15s.	£.7	10	0
15	14s.	10	10	0
9	12s.	5	8	0
2	18s.	1	16	0
		£.25	4	0
Value at putting up		18	0	0
Product of the carrots		£.7	4	0

They ate four hundred and ſeven buſhels, which at 7l. 4s. may be called 4d. per buſhel.

Your Secretary mentions my having ſent the experiment of the culture before, the profit neat per acre was about 2l.

This is a ſingle experiment, from which I ſhall draw few concluſions. I am of opinion that carrots will be found oftener much to exceed this than fall ſhort of it.

The land was ſown with barley, produced a good crop, and by much the cleaneſt of any in the pariſh. I ſhewed it to ſeveral gentlemen as an abſolutely *clean* crop; becauſe I had heard it aſſerted that the culture of carrots made land foul.

The graſs upon which the ſheep were fed (and which amounted to about an acre) was very little improved for the crop of hay 1781, owing to the dry ſeaſon; but in that of 1782 was greatly ſuperior to the adjoining parts of the ſame field, and more improved in quality than quantity; for inſtead of an indifferent vegetation ſcattered thick with the centaurea ſcabioſa, filage, rhinanthus criſta galli, and linum catharticum, with other plants of little worth, it encouraged a very beautiful ſheet of the beſt plants that can appear in a meadow, viz. the lathyrus pratenſis, achillea mille folium, trifolium repens, trifolium ochroleucrum, trifolium alpeſtre, and the plantago lanceolata.

As I have thus given you the reſult of this carrot experiment, I muſt be allowed juſt to obſerve, that this price of 4d. is great enough to induce any man to cultivate them. We reckon in this country that turnips rarely do more than pay their own expences, and in many years not that. But if a man has the right carrot ſoil, he may, without manure, and without any extraordinary fertility, expect from four to five hundred buſhels an acre. If he gets four hundred and twenty it is juſt 7l.; and as the expences amount to about 5l. it leaves a neat profit upon a fallow crop of 2l. an acre, which is greater than attends the beſt wheat crops of this kingdom.—I could extend theſe reflections, but as it is only a ſingle experiment, I do no more than call upon others to try ſimilar ones, that from a great variety of applications the real value may be known.

The winter following I tried a ſimilar experiment on potatoes; and as the reſult was remarkable, I ſhall add it.

Nov. 21, 1781, weighed alive ſixteen wether lambs, that, like the former, had had the ſummer's graſs. Average weight 89lb. in all 1,432lb. Hurdled a pen on dry graſs, and gave them potatoes, the cluſter ſort. In the firſt twenty-three days they ate but twenty-five buſhels. Perceiving them to look very thin, I weighed them again, January 14, and the total weight then was 1,264lb. they had conſequently loſt 168lb.; by the 16th, they had eaten ſixty buſhels, and I then put them to turnips. Thus nothing could be more deciſive againſt *this* application of cluſtered potatoes.

I was, however, informed in Ireland of a ſcore or two of wethers being raiſed to an uncommon degree of fatneſs by potatoes; but they were probably the common ſort, which I am apt to think, from ſome other caſes, as well as from their ſuperior farinaciouſneſs, are of a more feeding quality.

Thus having ventured theſe two ſmall experiments to your examination, permit me a few obſervations on the premiums offered by you in January 1782, an object of more general importance, and which, by being conſidered in various lights, and made a ſubject of diſcourſe in your aſſociated counties, muſt neceſſarily tend to throw your patriotick deſigns gradually into the very beſt channel for the publick good.

There are two great objects to which the exertions of ſuch a Society as your's may be directed:

1ſt. To introduce into ſuch parts of your county as are ill-cultivated, the huſbandry of other better-managed diſtricts.

2dly. To refine upon ſuch huſbandry, and attempt to carry it to an ideal perfection.

Subordinate and inferior are; *1ſt.* To procure general experimental information. *2dly.* To encourage the induſtry and ſkill of your labouring poor.

I perceive by your premiums that you have aimed at all theſe, and various other objects.

In whatever manner individuals of fortune may amuſe themſelves, and with whatever ſucceſs, ſtill I am of opinion that, relative to the general agriculture of a diſtrict, no refinement, no complex, difficult, or doubtful practices, ſhould be introduced or recommended. Theſe are the parts of the art that very often fail, and no endeavour fails without doing great miſchief to a whole neighbourhood. Suppoſe a gentleman in ſome remote part of Wales, where clover is quite unknown, inſtead of ſimply recommending the plant to be ſown on clean land, drills and horſe-hoes it, he fails; probably the plant itſelf in that diſtrict will lie under ſuch a ridicule that it would be rejected, even when others, where no ſuch failure had happened, had received it.

Your premiums for the culture of turnips are in the right channel, the great outline; but why a horſe-hoe for turnips? Can you wiſh for a greater improvement than to cover your dry lands with the noble crops of Norfolk? But (the fields of poſſibly two or three whimſical gentlemen excepted) there is not a horſe-hoed crop of turnips in that county; yet I have walked over fields near a mile a mile long, where the regularity of the plant, the compleatneſs of the hoeing, and the freedom from weeds, formed a truly beautiful ſpectacle. Norfolk huſbandry, on the dry lands of your counties, would make a noble figure, though a horſe-hoe had never exiſted.

Setting wheat is another practice of more refinement that has taken place in the eaſtern part of Norfolk, which is the manufacturing and very populous part of the county, but is not that diſtrict by any means which has given a ſanction to what is commonly called *Norfolk Huſbandry*, which excluſively belongs to the North-Eaſtern angle of the county, where little or no ſetting of wheat is to be met with. It is however a refinement on the clover tillage for wheat, and in my opinion ought no where to be attempted till the clover itſelf is generally and very well eſtabliſhed; ſince, ſhould the farmers once get an idea that ſetting wheat is *a part of that Huſbandry*, it might retard the full eſtabliſhment of clover, which would undoubtedly be doing more miſchief to your counties than all the exertions of an hundred ſocieties can ever do good.

Premiums 8 and 9, 14, 15, 28, 29, 43, buckwheat, vetches, carrots, rape, flax, apples, and cabbages, are unexceptionable; they come clearly within the firſt definition, introducing into your counties practices that ſucceed very well in common management elſewhere. But why give three guineas for the winter vetch, and ſix for the ſummer one? The winter vetch is an object of the firſt conſequence, the ſummer one of very little. Premium 15 does not ſay whether the rape is for feeding cattle or for ſeed; the former excellent huſbandry; the latter has alone ruined many farms.——But the object of ſainfoin (11) is of yet greater importance; you deſerve the greateſt praiſe for attending to that noble graſs.——But as to Hops, (44) the ſame obſervation is by no means applicable. It is a culture only fit for natural dunghills, or the vicinity of great cities. The greateſt improvement that could be introduced into Suſſex would be to grub up all the hops; five or ſix acres, on a farm of 100 or 150, nearly ruin it, by receiving all the dung. If you ſucceed, and make this a common huſbandry in your counties, think no more of turnips, cabbages, or any other plant that demands the dunghill.

Zealand barley, compoſts, potatoe ſeed, parſley, yellow vetch, the curl, and graſſes; they are all either refinements, or dubious, and conſequently come under that head which demands much conſideration.

ſideration. If you ſucceed, and they are introduced, it is unknown whether your ſucceſs be a benefit or not; whereas in other objects of greater account, no ſuch doubt can be entertained. I do not mean to find any fault with a wiſh to ſee *gentlemen* try experiments on parſley, which I believe is a valuable object, or with the yellow vetch, which I know experimentally to be one of the fineſt plants we have in England; but they are no points for Somerſet *farmers* to think of. As to *graſſes* properly called, you ſhould recollect one fact, that the very fineſt upland meadows, or low ones on a good ſoil, that are found in England, are thoſe that have leaſt *graſs*. It is the claſs *Diadelphia* that clothes the richeſt in the kingdom.

As to any premium relative to the *general* and *indiſcriminate* uſe of drill-ploughs and horſe-hoes, particularly for white corn, turnips, or ſainfoin, I think all attempts to introduce them perfectly viſionary; in ſome meaſure harmleſs, becauſe the introduction will never be affected; but hurtful to every ſociety that offers it, becauſe it will ſhew (to common farmers) that they are unacquainted with the objects they patronize; and he who recommends the broadcaſt culture of clover will do it with no great authority, if he couples with his advice the impracticable ſcheme of the Tullian culture of oats and barley.

With reſpect to the premium for fattening Turkies; how that can be a national object is perfectly incomprehenſible to me. When it is conſidered, that whatever food will fatten a turkey will alſo fatten a hog; that pork is food for the lower claſſes; and that poultry in ſuch a kingdom as this, muſt always be beyond their expenditure; it may not perhaps be thought of no conſequence, but rather (tending to make pork dearer) it may appear to be more prejudicial than uſeful.

Thus, gentlemen, I have troubled you with a few obſervations on your laſt year's premiums. It is a ſubject that nearly concerns all the ſocieties of the kingdom; for as the benefit they do muſt be chiefly by theſe means, it is an object of no trifling import, that they be deviſed with great caution, foreſight, and knowledge of the ſubject. A conſiderable degree of eſteem and reputation belong to men who give their time, attention, and money, for the publick good. Errors in them have a large range, and a proportionable effect. The miſtakes of an individual may concern only himſelf: If you commit one, three provinces will feel the weight. For this reaſon I think there is no ſubject more proper on which publickly to communicate with you. Some future correſpondent may correct me if I am wrong; but publick enquiries into the beſt means by which a Society can advance the agriculture of a country, are more likely to prove of conſequence, than the recital of any experiments in the power of an individual poſſeſſing no more advantages than I do.

I am, Gentlemen,

With all imaginable reſpect,

Your obliged and devoted ſervant,

ARTHUR YOUNG.

Bradfield-Hall, Dec. 21, 1782.

[The Society are much indebted to Mr. YOUNG for his ſeveral very obliging and valuable communications. In the liſt of their Premiums for 1783, he will obſerve attention has been paid to his ingenious hints and obſervations.]

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ARTICLE XXXI.

On the Nature of Soils.

[From a Norfolk Gentleman, to the Secretary.]

SIR,

AS a knowledge of the different ſoils is of great importance to the farmer, an enquiry into, and deſcription of their nature and properties, ſo far as relates to the great purpoſes of vegetation, ſeems to claim our firſt attention, and to be the ground-work of agriculture.

Without deſcending to thoſe nice diſtinctions, which are rather ſubjects of curioſity to the philoſopher, than of uſe to the farmer, we may rank all our varieties of ſoil under the following heads:

Sand,	Gravel,	Loam,
Clay,	Chalk,	Marle.

By different combinations of theſe ſubſtances, all the intermediate kinds of ſoil are formed; and upon a proper mixture of them, in certain proportions, depends the general fertility of the earth, and the ſucceſs of the farmer's labour.

In the nature of ſoils, the two extremes are, tough wet clay, and looſe dry ſand. Each of theſe has its peculiar plants, which will not grow in the other, although they are few in number, and of little known uſe. But the plants common to both theſe ſoils will grow and thrive better in loam, which is a middle ſpecies of earth compoſed of theſe two extremes, partaking equally of the good qualities of both, without the bad ones. For this reaſon, lands which partake of the different properties of clay and ſand, or which, in other words, are a kind of compound wherein the properties of clay and ſand are ſo united as to correct each other, are generally the moſt fruitful, and produce the greateſt maſs of vegetables. This will more evidently appear, if it be conſidered in what manner plants and vegetables are nouriſhed, and what it is that gives them bulk, vigour, and firmneſs.

When the ſeeds of plants are depoſited in the earth, certain degrees of warmth, air, and moiſture, are neceſſary for the expanſion of their veſſels, and the extenſion and firmneſs of their fibres and ſolid parts. For theſe purpoſes ſtiff clay, and looſe ſand, are both, while ſeparate, very unfavourable; the former, by the cloſeneſs of its texture, retains the water like a diſh, admits too little heat or air, and prevents the tender fibres of young plants from ſhooting freely to ſuch diſtances as are neceſſary for obtaining a ſufficient quantity of proper nouriſhment. The latter (ſand) from the looſeneſs of its texture, admits heat too freely, and is not capable of retaining a ſufficient degree of moiſture for the purpoſes of vegetation. The particles of vegetable nutriment are either abſorbed by the heat, or waſhed down by the rains too low for the roots of plants to reach them. Hence few plants will come to maturity on mere ſand, except ſuch as extend their roots very deep, and attract nouriſhment from a ſtratum below it.

It is neceſſary alſo to obſerve, that in ſtiff clays there is little fermentation, the ſalts being ſo confined and locked up by the tenacity of its texture, that they cannot act. On the contrary, in light dry ſands they are ſpeedily evaporated by heat.

All ſands are hot and dry—all clays cold and wet; and therefore the manuring ſandy lands with clay, or clay lands with ſand, is the beſt of all, for this changes the nature of the land itſelf; whereas dung, and other ſubſtances, afford only an inferior and temporary improvement. Mixed ſoils, which incline to the clayey kind, are beſt of all for corn and pulſe. But it is not the natural ſoil only that the farmers ought to conſider, but

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the depth of it, and what lies immediately underneath it. For if the richeſt ſoil is only ſeven or eight inches deep, and lies on a cold wet clay or ſtone, it will not be ſo fruitful as leaner ſoils that lie on a better under-ſtratum.

Gravel is perhaps the beſt under-ſtratum to make the land prolifick.

The beſt loams, and natural earths, are of a bright brown, or hazely colour. Hence they are in this county called hazel loams. They cut ſmooth, and tolerably eaſy, without clinging to the ſpade or ploughſhare;—are light, friable, and fall into ſmall clods, without chapping or cracking in dry weather, or turning into mortar when wet. Next to theſe, the dark grey, and ruſſet mould, are accounted the beſt. The worſt of all are the light and dark aſh-coloured.

The goodneſs of land may alſo be very well judged of by the ſmell and the touch. The *beſt* emits a freſh pleaſant ſcent, on being dug or ploughed up, eſpecially after rain; and being a juſt proportion of ſand and clay intimately blended, will not ſtick much to the fingers on handling. But all ſoils, however good, may be impoveriſhed, and even worn out by ſucceſſive crops without reſt, eſpecially if the ploughings are not very frequently repeated before the ſeed is ſown.

The famous Mr. Tull, indeed, carried his idea of the advantage of repeated ploughings to ſuch a height, as to ſuppoſe they would ſupply the place of manure entirely. This was doubtleſs an error; but an error which men are very liable to fall into from their warmth in ſupporting a favourite hypotheſis. Repeated ploughings, however, are an excellent method of rendering land ſweet and fertile, by deſtroying the weeds, and expoſing all its parts to the kindly influence of the ſun and air, by which means it attracts a larger quantity of ſalts, and is better pulverized.

If we examine tracts of land which have not been cultivated, we find nature has adapted different kinds of plants to moſt of the diſtinguiſhable varieties of ſoils; and although ſome belonging to *one*, may from ſome cauſe or other be found on lands of a different quality, they ſeldom thrive, or perfect their ſeeds, ſo as to become general.

Mr. Tull thinks that the only difference in ſoils, except their richneſs, is occaſioned by the different degrees of heat and moiſture that they

receive;

receive; and that *earth*, of whatever kind it be, is equally proper for the production of plants in general, provided the heat and moiſture be equally adjuſted. But in this I am inclined to think Mr. TULL is miſtaken.

His inſtance that ruſhes, when taken from a low watery ground, and planted on a dry hill, will grow and flouriſh there, provided a plenty of water be given them, does not prove his poſition: For in this caſe, by the addition of water, the ſtate of the ſoil is changed, and becomes ſimilar to that from whence the ruſhes were taken, and which is natural to them.

There is (as I before obſerved) a ſpecifick difference of ſoils, and of the plants naturally growing in each.

The great care of the farmer ought therefore to be, by proper mixtures, to reduce his land to that ſtate and temperament in which the extremes of hot and cold, wet and dry, are beſt corrected by each other; to give them every poſſible advantage flowing from the benign influences of ſun and air; to adopt ſuch kinds of plants as they afford in this ſtate the greateſt nouriſhment to; and to renew their fertility by a judicious allowance of the moſt proper manures. Where theſe things are done, there are few ſpots ſo unfriendly to cultivation as not to repay his expence and labour with a plentiful increaſe: But without theſe, the beſt tracts of land will in time become a barren waſte, or produce little but weeds.

I am, &c.

W——n, Feb. 28, 1783. T. S.

P. S. In my next I will conſider chalky ſoils.

ARTICLE XXXII.

Some of the ſuperior Advantages of the Drill to the Broadcaſt Huſbandry pointed out.

[By a Gentleman Farmer in Kent.]

GENTLEMEN,

SEEING by your advertiſements in the St. James's Chronicle, that the publiſhing a ſecond volume of Select Papers was one of your reſolutions, I am induced to offer a few remarks on the Drill Huſbandry; the ſubſtance at leaſt of which I ſhould be happy to ſee inſerted therein, if you think them worthy your attention.

Notwithſtanding the decided ſuperiority of the Drill-Huſbandry in many kinds of grain, pulſe, and graſſes, many farmers are ſtill enemies to it; and a ſtill greater number are too indolent to go one ſtep out of the old beaten path, though the advantages they might reap are obvious.

This was the caſe many years in this county with reſpect to hoeing of turnips; but thoſe prejudices are now generally overcome; and we have very few, if any, farmers ſtupid or obſtinate enough to ſow turnips without having them twice will hoed.

Some reaſons indeed may be urged in favour of a few perſons not adopting the Drill-Huſbandry, becauſe the warmeſt advocates for it muſt allow, that there are ſoils, and ſituations, wherein the broadcaſt method is preferable, at leaſt in many caſes. But theſe inſtances are but few, and ought not by any means to check it in the general.

Drill-Huſbandry is, as a good writer has juſtly defined it, "*the practice of a garden brought into "the field.*" Every man of the leaſt reflection muſt be ſenſible, that the practice of the garden is much *better* than that of the field, only a little more expenſive; but if (as is the caſe) this extra expence be generally much more than repaid by the ſuperior goodneſs and value of drilled crops, it ought to have no weight in comparing the two modes of huſbandry.

In the broadcaſt method the land is often ſown in bad tilth, and always ſcattered at random, ſometimes by very unſkilful hands. In drilling, the land muſt be in fine order; the ſeed is ſet in trenches drawn regularly, all of nearly an equal depth, and that depth ſuited to the nature of each kind of ſeed. Theſe ſeeds are alſo diſtributed at proper diſtances, and by being equally and ſpeedily covered, are protected from vermin and other injuries; ſo that the practice of the garden is here exactly introduced into the field.

In the broadcaſt method, the ſeed falls in ſome places too thick, in others too thin; and being imperfectly covered, a part of it is devoured by vermin which follow the ſower; another part is left expoſed to rain or froſt, or to heats, which greatly injure it. When harrowed in, a great part of it (ſmall ſeeds eſpecially) is buried ſo deep, that if the ſoil be wet, it periſhes before it can vegetate.

Again; When thus ſown, there is no meddling with the crop afterwards, becauſe its growth is irregular. The ſoil cannot be broken to give it more nouriſhment, nor can even the weeds be deſtroyed without much inconvenience and injury.

But in the Drill-Huſbandry, the intervals between the rows, whether double or ſingle, may be horſe-hoed; and thereby nouriſhment may repeatedly be given to the plants, and the weeds almoſt totally deſtroyed.

The very ſame effects which digging has upon young ſhrubs and trees in a garden, will reſult from horſe-hoeing in a field, whether the crop be corn or pulſe; for the reaſon of the thing is the ſame in both caſes, and, being founded in nature and fact, cannot ever fail. In drilling, no more plants are raiſed on the ſoil than it can well ſupport; and by dividing and breaking the ground, they have the full advantage of all its fertility.

The plough prepares the land for a crop, but goes no further; for in the broadcaſt huſbandry it cannot be uſed; but the crop receives greater benefit from the tillage of the land by the horſe-hoe, while it is growing, than it could in the preparation. No care in tilling the land previous to ſowing can prevent weeds riſing with the crop; and if theſe weeds be not deſtroyed while the crop is growing, they will greatly injure it. In the broadcaſt huſbandry this cannot be done; but in drilling the horſe-hoe will effect it eaſily.

And what adds to the farmer's misfortune is, that the moſt pernicious weeds have ſeeds winged with down, which are carried by the wind to great diſtances; ſuch are thiſtles, ſowthiſtles, coltsfoot, and ſome others.

If the expence of horſe-hoeing be objected, there are two anſwers which may very properly be made: the firſt is, that this expence is much leſs than that of hand-hoeing were is practicable, or of hand-weeding. The ſecond is, that it is more than repaid by the quantity of ſeed ſaved by drilling; to ſay nothing of the extra quantity and goodneſs of the crops, which are generally ſelf-evident.

From theſe conſiderations, founded on, and juſtly drawn from eſtabliſhed facts, the comparative advantage is ſo great in favour of the drill-huſbandry, that it muſt be ſtrikingly viſible to every unprejudiced perſon.

I am, Gentlemen, your's, &c.

R——r, Feb. 16, 1783. H. L.

ARTICLE

ARTICLE XXXIII.

On drilling Turnips with Wheat, drilled between the Rows.

[By an Hertfordſhire Correſpondent.]

GENTLEMEN,

I RECEIVED the premium-book ſent by your Secretary, for which you have my thanks. I will endeavour if poſſible to procure ſatisfactory anſwers to your printed queries; but in the mean time beg leave to inform you of an experiment made by an ingenious farmer in my neighbourhood, which to me is *new*, but I think a very good one.

Having drilled a ſmall field of ſpring wheat in rows two feet apart, a thought ſtruck him of ſowing turnips in the intervals. Accordingly, in May, he did ſo by hand. The turnips came up very well, and were thinned with the hoe once. The wheat was a very good crop, and yielded better than another field of about the ſame ſoil did, ſown broadcaſt in autumn, although it ripened ſomewhat later. On cutting it, the turnips were no otherwiſe injured, than by having ſome of the large leaves trodden down by the reapers.

After harveſt, the weeds were cut up round the turnips with a hand-hoe, and they grew very large and vigorous. They were of the purple and white long kind, and the crop proved nearly as good as the ſame land produced in common.

The farmer fed them off the field in December, and ploughing in the ſtubble, left it in that ſtate till March, when he prepared it by two more ploughings for barley and clover, of which he had a crop that yielded near forty buſhels per acre, and the plant of clover was ſo good that the cattle preferred the ſtraw to common hay.

I am, your very humble ſervant,

B—d, Oct. 6, 1781. T. N.

ARTICLE XXXIV.

On Quick-Hedges.

[By a Gentleman near Bridgwater.]

GENTLEMEN, February 21, 1783.

HAVING been lately through Glouceſterſhire, or at leaſt that part of it between Bath and Cirenceſter, I was much ſurprized to ſee ſuch a number of dead wall fences ſtill remaining, to the diſgrace of the country and its owners.

If they regarded beauty, or uſe, or the ſaving expence in the leaſt degree, I think they would follow the example of their wiſer neighbours in raiſing quick-hedges, which are not only more ornamental, but alſo far more uſeful and profitable. The benefits which cattle receive from their ſhelter in winter, and their ſhade in ſummer, and which the owners would reap by the thorns and fire-wood they yield, are matters too important for any good farmer to neglect, without incurring deſerved cenſure.

In all incloſed lands, the farmer muſt keep up good fences, if he would reap the fruits of his labour; for by theſe it is that his crops are protected from external injuries.

There are many ſhrubs of which hedges may be made, but among them all there are none equal to the white and black thorns, that will ſuit the generality of ſoils, and are eaſily propagated. But a good huſbandman will never think his hedge finiſhed till he has placed trees in different parts of it, and of ſuch kinds as are beſt adapted to his reſpective ſoil. In order to know what kinds of trees theſe are, he need only obſerve which ſorts flouriſh beſt on the ſame kinds of ſoil in other places.

As I have had ſome experience in rearing quick-hedges, permit me to mention the methods I took in raiſing and preſerving them.

I have for more than thirty years cultivated about one hundred acres of land, principally on account of its being to me a pleaſing employment. When I firſt ſucceeded to this eſtate, there had indeed been ſome quick-hedges formerly planted; but they had been ſo badly managed as to be of little uſe, and incapable of much improvement. I therefore rather choſe to plant them a-new, than to run the riſk of unſucceſsful labour and expence in trying to recover and bring the old ones into good order.

Some of my plants I raiſed in a nurſery from the haws, and others I drew up in the woods, and wherever they could be found. I made my banks flat, and three feet wide at the top, with a ſloping ſide next the ditches, which were dug two feet below the ſurface of the field, and one foot wide at the bottom. The turfs were regularly laid with the graſs downward, on that ſide of the ditch on which the hedge was to be raiſed, and the beſt of the mould laid at top. My ſets were ſtrait, ſmooth, and even growing ones, and planted as ſoon as poſſible after taking up. I planted them at a foot diſtance; and about every forty feet I ſet young fruit or other trees, ſuch as aſh, oak, beech, elm, according as the ſoil ſuited them. I then laid in a ſecond row of quickſets, on another bed of freſh earth, at the ſame diſtance, and covered them over with good mould. The planting thus ended, I finiſhed the bank, and ſecured it properly from injuries by a dead hedge well wrought together, and faſtened by ſtakes of oak trees on the top of the bank at three feet diſtance.

The time I planted it was the latter end of February, which time I prefer to October, and in general the plants ſucceed beſt at that time. In autumn I cleared it from weeds.

The following ſpring I examined my hedges carefully, ſecuring the ſtakes where they were looſened, and filling up any holes that were made. Wherever any of the quick-ſets had failed, or appeared dwindling, I replaced them with freſh ones from my nurſery; and alſo ſuch of the young trees as had been planted on the top of the bank; and cleared the whole from weeds.

In one field it happened that my ſheep had eaten off many of the young ſhoots; but as I thought they would recover, I did not replace them; but I afterwards found it would have been beſt to have done ſo, for they never grew ſo as to overtake the reſt, and this hedge was unequal and much inferior to the other. The principal care now neceſſary was, to keep the quick free from weeds, and well protected from cattle, till it was of an age fit for plaſhing, which, if it is healthy and vigorous, may be done in its ſeventh or eighth year. It will however be right to go over it once a year during that time with a knife, and cut off the redundant, or ill-ſhaped and ſtraggling branches, keeping the face of it as ſmooth and even as poſſible; and alſo root up all entangling weeds, which, by confining it, would otherwiſe ſpoil its beauty, and hinder its growth.

The weeds moſt deſtructive to young hedges are, white and black bryony, bindweed, and the traveller's joy.

White bryony has leaves like the vine, and its berries are red; the root is as big as a man's leg, and runs very deep. Black bryony will grow thirty feet long, and with its claſping tendrils will entangle and choke the young quick all the way. As its root is very large, it muſt be dug out deep to deſtroy it.

Traveller's joy has woody ſtalks, with a rough bark; the leaves are ſmall, and of a pale colour, and it bears white cottony tuſts in autumn; it is more deſtructive to young quick-hedges than any other, overſhading it like an arbour. The root of this plant is not deep like the reſt, but care muſt be taken to get it up entire, for the leaſt piece left will ſend up freſh ſhoots next ſpring.

The firſt plaſhing may be performed at eight years old, but this ſhould be repeated at fourteen or twenty years growth; the firſt will be the leaſt troubleſome,—the laſt moſt neceſſary. The method of plaſhing being pretty well known in places where quick-hedges are common, I ſhall not enlarge upon it, eſpecially as there are ſome very proper directions given in the Farmer's Magazine, a work abounding with uſeful and intereſting matter to the huſbandman.

But I would obſerve, that at the firſt plaſhing, all the rubbiſh, weeds, and filth, ſhould be cleaned away from the roots of the young quick, the ſuperfluous ſtraggling roots cut off, and a quantity of the beſt mould from the bottom of the ditch ſhould be laid on them to fill up the hole, and ſtrengthen the plants; at the ſame time the fruit, or young timber trees, ſhould be pruned up.

When the hedge is new plaſhed, it ſhoots out very vigorouſly, and theſe freſh young ſhoots are very tempting to cattle. They ſhould therefore be well ſecured; and if you can avoid it, never feed cattle in the field that ſame year. But if ſome cattle muſt be paſtured there, horſes will do far leſs injury than cows, oxen, or ſheep; the latter are worſt of all. The beſt ſeaſon for plaſhing, as well as for planting quick-hedges, is February.

I ſhall now add a few obſervations relative to the advantage ariſing from quick-hedges. This greatly depends on the care taken by the farmer, at the time of plaſhing, to ſee the work done himſelf. If he leaves it to careleſs and negligent workmen, the labour and coſt of years may be loſt in a day.

If hedges were of no other uſe than as fences, it would be the farmer's intereſt to keep them up carefully; for the better they are, the more ſecure are his cattle and crops. But if a judicious mixture of cyder fruit-trees were planted in hedges, the profit ariſing from *them only* would abundantly repay all the coſt of the whole, without any loſs of ground.

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It may poſſibly be objected by ſome, that the hedges would often be hurt by the boys climbing up to get the fruit; but thoſe who make it ſhould remember, or be told, that the beſt kinds of cyder-fruit are ſo hard and auſtere at the time of their being gathered, that nobody can eat them, and even hogs will hardly touch them. But the greateſt benefit, where no fruit-trees are planted, ariſes from the thorns and wood which quick-hedges yield for the fire, and many other purpoſes.

I have in a ſingle year, from my hedges, and the trees I planted in them, cut as much wood as I ſold for eight or ten guineas, excluſive of the expence, and the quantity I uſed for other purpoſes.

I am, Gentlemen,

your humble ſervant,

A. B.

Article XXXV.

On Planting Waſte Grounds.

[From a Norfolk Gentleman, a Viſitor at Bath.]

Gentlemen,

As I have made planting a favourite amuſement, I take the freedom of ſubmitting a few thoughts thereon to your conſideration.

My reſidence is in Norfolk, a county in which ſixty years ſince there were vaſt tracts of uncultivated, and, as was then thought, barren land. The weſtern parts of it abounded with ſands of ſo light a texture, that they were carried about by every wind; and in many places the ſands were ſo looſe that no graſs could grow upon them.

Art and induſtry, however, have now ſo altered the face of this once Arabian deſert, that it wears a very different appearance. Moſt of theſe tracts are either planted, or rendered very good corn-land, or ſheep-walks.

I ſee by your laſt volume you have already been informed by Mr. Beevor, and other Gentlemen, of the progreſs and effects of marling, and of their turnip huſbandry; and therefore ſhall confine my preſent remarks principally to planting, eſpecially as my reſidence is in that part of the county where the moſt barren ſoil has been thus enriched.

About thirty years ſince, the ſides of many of our little ſand-hills were ſown with the ſeeds of French furze, and when a wet ſeaſon followed, they ſucceeded very well, and grew ſo faſt that once in three or four years they are cut for fuel, and ſell at a good price at Thetford, Brandon, Herling, Swaffham, and places adjacent. This excited ſome publick-ſpirited Gentlemen, among whom was the late Mr. BUXTON, of Shadwell-Lodge, near Thetford, to attempt the planting of Scotch and ſpruce firs, and other hardy foreſt-trees. At firſt they found ſome difficulty from the extreme looſeneſs of the ſand. But as there is in all this part of the county fine white and yellow marle, at about three feet depth below the ſand, they very judiciouſly thought that incorporating it with the ſand in the holes where their young trees were planted, would inſure ſucceſs; nor were they diſappointed.

The method ſucceeded beyond expectation; the plantations throve exceedingly, and the roots ſoon reached below the ſand, after which they were out of danger. This excited them to further attempts.

On the ſpots where they intended to raiſe new plantations from ſeeds and acorns, they laid on a thick coat of marle and clay, which, after being rough ſpread, and lying a winter in that ſtate, was made fine, and ploughed in juſt before planting. By theſe means the ſoil became fixed, and in a little time covered with graſs and herbage; ſo that there are now vaſt plantations of firs, oak, and foreſt-trees, in the moſt healthy and vigorous ſtate, where within my memory ten acres of land would not maintain a ſingle ſheep three months.

But the benefit of plantations, whether of ſhrubs, copſe, or trees, is not confined to the immediate advantage, or even the future value of the wood. By annually ſhedding a great number of leaves, which the winds diſperſe, and the rain waſh into the ſoil, it is conſiderably improved; and whenever ſuch copſes have been ſtubbed up, the ground (however unfruitful before planting) has thereby been ſo enriched as to bear excellent crops for many years, without the additional help of manure.

How much land-owners are intereſted in planting waſte or barren ſpots, I need not mention; and nothing but a degree of indolence or ignorance, unpardonable in this enlightened age, could induce them to neglect it.

Nature has furniſhed us with plants, trees, and ſhrubs, adapted to almoſt every ſoil and ſituation; and as the laws of vegetation are now much better underſtood than formerly, it is a reproach to thoſe whoſe practice does not keep pace with their knowledge in making the beſt uſe of her bounty.

Let no man repine and ſay *the land is barren*; for thoſe ſpots which appear to be ſo, owe that appearance to human negligence. Induſtry and art might ſoon render an eighth part of this kingdom nearly as valuable as the reſt, which now remains in a ſtate unprofitable to the owners, and diſgraceful to the community.

I have the honour to be, Gentlemen,

Your very humble ſervant,

March 7, 1783. W. H——N,

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ARTICLE

ARTICLE XXXVI.

Obſervations on Cow-Clover, and Cow-Wheat.

[By Mr. WILLIAM CURTIS, Author of the Flora
Londinenſis.]

GENTLEMEN,

THE ſubject of the queries which I had the honour of receiving from you, has often engaged my attention; and I have frequently wondered that many ſenſible farmers and ſeeds-men with whom I am acquainted, or have converſed, ſhould know ſo little of a plant for which the latter have ſo great a demand. If the following obſervations ſhould prove in the leaſt ſatisfactory, I ſhall be highly gratified.

1ſt. Cow-Clover, or *Cow-Graſs*, are, I doubt not, the ſame plant: but Cow-Wheat belongs to a very different genus; the *Melampyrus* of Linnæus.

2dly. There are, growing wild in this country, two ſpecies of clover, much reſembling each other in ſize, and in the colour of their bloſſoms.—The one is the *Trefolium Pratenſe*; the other, the *Trefolium Alpeſtre* of Linnæus. The former is the common broad-leaved clover; the latter, the long-leaved, or creeping-rooted clover; for it differs from the common broad-leaved kind, not only in having longer and narrower leaves, but alſo in having a root not only perennial, but creeping.

Although I know with certainty that the ſeed of the broad-leaved clover is ſold in the London ſhops for the true Cow-graſs, yet I have often ſuſpected that the different name of Cow-graſs might originally have been given to the long-leaved ſort, from its poſſeſſing ſome qualities ſuperior to the other; and its ſeed not having been collected, the other has ſupplied its place.

However this may be, the aſcertaining which of the two is the beſt food for cattle, is certainly an object worthy the Society's attention. If it ſhould be found that the *Alpeſtre* is in any reſpect ſuperior to the *Pratenſe*, you may be the means of bringing it into general uſe. But ſhould it prove inferior, the diſtinction of Cow-graſs will be aboliſhed, and the farmer will be taught to depend on broad-leaved clover only.

I herewith ſend you a growing root of the *Alpeſtre*, or true long-leaved clover. A loamy ſoil will beſt ſuit it.

3dly. The ſeeds of the Cow-wheat are not to be had in any of the London ſhops. From the little experience I have had in cultivating this genus of plants, they do not ſeem to promiſe much; yet I would by no means wiſh to prevent or even to diſcourage your making a fair trial of them.

I am, with great reſpect, your's, &c.

WILLIAM CURTIS.

Nov. 8, 1780.

ARTICLE XXXVII.

On Cow-Wheat, Cow-Graſs, and Cow-Clover.

GENTLEMEN,

IN anſwer to your Secretary's queries reſpecting Cow-Graſs, Cow-Clover, and Cow-Wheat, be pleaſed to accept the following:—

I conceive that Cow-Graſs, and Cow-Clover, have no ſpecifick diſtinction. All the graſſes and trefoils [*Trefolia*] are almoſt indiſcriminately cropt in a certain ſtate of vegetation by every neat beaſt. Theſe diſtinctions muſt therefore be arbitrary or local, as the *Briza*, or Quaking-Graſs, is in ſome counties called the Cow-Quake.

With reſpect to Cow-Wheat, it is unqueſtionably the *Melampyrum Arvenſe*, (purple Cow-Wheat) and has no affinity with either clover or graſs; but is a good food for cattle, and as ſuch it has been divers times recommended as a ſubject proper for cultivation.

It is a ſcarce plant, and perhaps not to be found in five counties in the kingdom; and being cropt cloſe in almoſt every paſture where it grows, when ſuch paſtures are fed, it is rarely found but in difficult acclivities, or under the protection of brambles, furze, or thorns; and doth not arrive at maturity till late in the year.

It is a large plant, bearing a ſpike of purple flowers, with numerous floral leaves of the ſame colour. Its ſeeds when ripe have a near reſemblance to wheat, from which circumſtance, no doubt, it obtained its name. Perhaps it is not to be bought at any ſeed ſhop. I have not yet ſeen it in any botanick gardens. Incloſed are ſpecimens of a few plants growing near Norwich, among which is one of the Cow-Wheat.

I am, very reſpectfully, your's, &c.

Norwich. J. WAGSTAFFE.

Article XXXVIII.

On the Profit of Carrots and Cabbages.

Sir,

SINCE I received your laſt favour, the weather has been ſo very inclement, that I had it not in my power till yeſterday to aſcertain with any degree of preciſion the weight or value of my crops of carrots and cabbages. In all my farming experiments, I would wiſh to avoid as much as poſſible all exaggerating ideas of the value of the produce; and for this reaſon I ſelected ſuch parts of the field as were neither the *beſt* nor the *worſt* of the crop. They were weighed with great exactneſs, and can be atteſted (if deſired) on oath.

With reſpect to the former crop, (I mean of carrots) you will find the expence attending this method of cultivation greatly reduced, when compared with the crop for which I received the Society's premium in the year 1779; and yet the produce per acre was very little inferior. I never remember to have met in any Author with experiments to prove how far carrots may be profitably applied to the feeding of ſheep in the months of March and April. To that purpoſe I intend devoting the whole five acres, and have no doubt but the profit attending this mode of conſumption will equal any other.

How far my cabbage crop entitles me to the notice and approbation of the Society, I will not pretend to ſay; the cultivation and attention paid unto it deſerved a better return. Yet I muſt obſerve, that conſidering the number of ſugar-loaf intermixed with the Scotch, the produce is equal, if not ſuperior, to any I ever read of; I mean on land of equal value. Beſides, I muſt remark, that out of fifteen acres, certainly three acres of the right ſort might be produced, which, if ſelected, would weigh at leaſt ten tons per acre more than the annexed calculation.

However, I ſubmit to the Society's determination, having no other view than the promotion of thoſe good ends for which it was eſtabliſhed.

I am, Sir,

Your humble ſervant,

Aſhwick-Grove, J. BILLINGSLEY.
Nov. 12, 1781.

CARROTS.

CARROTS.

Two perch dug in different parts of the field, neither the beſt nor worſt, produced, One 114lb. the other 104lb. Average 109lb. or 7 tons 15 cwt. per acre, which at only 20s. per ton, amounts to — £.7 15 0

Expences per acre						
Rent —	£.1	0	0			
3 ploughings	0	12	0			
3 harrowings	0	3	0			
Sowing —	0	0	6			
Seed - —	0	4	0			
Two hoeings	0	7	6	2	7	0
Profit				£.5	8	0

As I purpoſe ploughing out, and folding the ſheep on them, that expence will not exceed 5s. per acre.

CABBAGES.

One row cut from end to end of the field, weighed 32 cwt. or per acre 36 tons, which, at 4s. 6d. per ton, amounts to — — £.7 4 0

Expences per acre.						
Rent —	£.0	10	0			
Manure —	1	10	0			
Three ploughings -	0	12	0			
Two harrowings -	0	3	0			
Sowing, ſeed, and tranſplanting —	0	10	0			
Hand and horſe-hoeing	0	8	0	3	13	0
Profit				£.3	11	0

N. B. This land is in moſt excellent preparation for a crop of barley next ſpring; ſcarcely a weed to be ſeen in the whole field.

ARTICLE XXXIX.

On the Scab in Sheep, and ſome approved Remedies recommended.

[By a Gentlemen Farmer near Norwich.]

GENTLEMEN,

AS the diſeaſe called the ſcab in ſheep is very often fatal, and occaſions great loſs to the farmer, I beg leave to trouble you with a few remarks thereon; and alſo to mention ſome of the beſt remedies yet diſcovered among our ſheep breeders.

This diſeaſe is generally found moſt prevalent where the lands on which ſheep are kept are wetteſt, or in the moſt rainy ſeaſons.

In the iſle of Ely ſome years ſince moſt of their flocks were diſeaſed, and great numbers died. But I am of opinion, that this diſorder is not always the effect either of moiſt air and food, or of lying on wet ground. It is doubtleſs often occaſioned by the blood and juices of the animal being in an impure ſtate; to which, however, an exceſs of moiſture and rank food may very much contribute.

Many perſons have ſuppoſed the ſcab to be merely a cutaneous diſeaſe, and of courſe applied only external remedies to the part immediately affected, without conſidering that a purification of the blood was neceſſary to a radical cure. In ſuch caſes, theſe applications, adminiſtered ſingly, often do more harm than good, becauſe they drive in the eruption, and fix the diſeaſe in the internal and more noble parts of the animal.

The beſt way therefore to treat this diſorder is, on its firſt appearance, to give the ſheep ſomething inwardly to drive *out* the eruption; and then external applications are made with propriety, and generally with ſucceſs.

The following recipe has been tried and found effectual in numerous inſtances in this county and in Suffolk, where very large flocks are kept:—

Take a gallon of ſoft well or pond water, and divide it into two equal parts. In one pint diſſolve eight ounces of old hard ſoap, to which, when diſſolved, add two ounces of ſpirits of hartſhorn, and half a pound of common ſalt, with four ounces of roll brimſtone, finely powdered and ſifted. In the other part of the water put two ounces of leaf tobacco, and one ounce of hellebore root. Boil this ſecond part till you have a ſtrong infuſion, and then ſtrain it off.

Next take that part of the water firſt mentioned, and ſet it over the fire; let it boil half an hour, ſtirring it all the while with a wooden ladle. In the mean time heat again the ſecond part, in which the tobacco and hellebore were infuſed; and when hot mix the two parts gradually together over the fire, keeping the mixture ſtirring all the time, which ſhould be about a quarter of an hour. When quite cold, put it in a ſtone bottle for uſe, and ſet it in a cool place.

Then take four quarts of new ale or beer, put into it twelve ounces of ſalt, two ounces of bay ſalt, and eight ounces of pounded nitre, together with twelve ounces of pounded roll brimſtone. Set them over a gentle fire, and when the ale boils take off the ſcum. When it has boiled half an hour, ſet it by to cool, and when cold put it in a ſtone bottle for uſe.

When you are thus far prepared, take one quart of ale, and ſet on the fire, mix into it by degrees three ounces of ſulphur; when juſt ready to boil, take it off the fire, and let it ſtand to cool; and when only blood warm, give this quantity inwardly to three ſheep. Repeat the doſe three times, allowing one day's interval between each doſe. This will drive out the diſorder; and *then* the *firſt* mixture is to be rubbed on the diſtempered parts; and two days afterwards the *ſecond* mixture, and ſo on alternately for eight or ten days, 'till the cure is effected. Sometimes two rubbings will be ſufficient.

The only objection to this mode of cure is, that it is compound, troubleſome, and rather expenſive. This certainly has weight, becauſe where a large number of ſheep are affected, it could not eaſily be practiſed. On this account ſome perſons have adopted the following method of treating the diſeaſe, and with ſucceſs alſo:——

Take half an ounce of good corroſive ſublimate, and diſſolve it in two quarts of rain water, to which add a common gill glaſs of ſpirits of turpentine. When the ſheep is ſtruck, make a circle round the maggots with ſome of the water, dropping it out of a bottle. This will prevent their getting away and hiding themſelves among the wool. Then drop a little among them, and rub it about with the finger, which will preſently kill them.

But I am ſtill of the opinion, that ſomething given inwardly is neceſſary to purify the blood; and perhaps nothing can be more efficacious than the firſt mixture deſcribed above. I have tried both methods, and always found, that when internal as well as external applications were uſed, the cure was moſt radical and laſting.

I am, Gentlemen,

Your faithful friend and ſervant,

T. B——R.

H——l, March 12, 1781.

Article XL.

On preſerving Turnips from the Fly.

[By a Gentleman Farmer at Drayton in Norfolk.]

Gentlemen,

THE variety of experiments made uſe of during many years paſt for preſerving that excellent and uſeful plant the turnip from the ravages of the fly, having proved in many inſtances ineffectual, or at leaſt inadequate to the purpoſe intended; permit me, thro' the channel of your intereſting publication, to offer the following to the public, which, from three ſucceſſive years trial, I have found to anſwer in every reſpect. My diſcovery was owing to the following accident:——

A neighbouring farmer not having a ſufficient quantity of manure for all his turnip land, was under the neceſſity of ſowing four acres unmanured. The effect was, that the turnips on the manured part of the land were moſtly eaten off by the fly; while four acres unmanured eſcaped without injury.

Having a ſmall farm which I occupy for my own amuſement, and being very anxious to promote improvements in agriculture, I determined in the following ſeaſon to make ſome experiments from the above hint. Accordingly, in the ſummer 1776, I manured five acres well for turnips, and tilled three acres and a half in the uſual way without any manure. Thoſe which I manured were almoſt univerſally deſtroyed by the fly, in ſo much, that I was obliged to ſow moſt of the land over again. The three acres and half which had no manure were intirely free from any injury. It muſt indeed be confeſſed, that when I came to draw them, they were not nearly ſo large plants as the other.

Not

Not content with this ſingle trial, I determined to repeat my experiment ſtill farther: therefore, in the latter end of autumn 1776, after having taken the haulm and ſeed off, I manured ſix acres of wheat-ſtubble, which I intended for turnips the enſuing ſeaſon. This done, I immediately plowed it, leaving it to incorporate freely with the earth till the following ſummer, which had the deſired effect; for the turnips which grew upon it were as large as thoſe on the land which had been manured.

The two ſucceeding years, 1778 and 1779, I repeated this experiment, which anſwered beyond my utmoſt expectation. Hence I infer, that the fly is either ingendered in the new muck [dung] or inticed by it. But when this manure is laid on in the autumn preceding, it loſes all its noxious qualities, and, from what I have obſerved, retains all its nutritive ones; though, philoſophically ſpeaking, they are liable to be in ſome degree exhaled by the heat of the ſun.

Another material advantage accruing from autumn manuring for turnips is, that all the ſeeds contained in the manure, and which of courſe are carried on the land with it, vegetate almoſt immediately, and are moſtly killed by the ſeverity of the winter; and the few that remain can ſeldom avoid deſtruction from the ploughſhare.

This is a more effectual means of cleanſing lands of weeds than has hitherto been uſed, and conſiderably leſſens the labour of turnip-hoers.

ARTICLE XLI.

On ſowing Turnips and Grain, and on ſome of the Diſcouragements which prevent Improvements in Agriculture.

[By a Gentleman Farmer in Eſſex.]

GENTLEMEN,

I HAVE lately been favoured with a ſight of your firſt volume of ſelect papers, and find many very uſeful things contained therein: but I wiſh your correſpondents would principally attend to facts eſtabliſhed only by experience; for philoſophical opinions, unſupported by facts, appear to me to bewilder rather than eſtabliſh and inform.*

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* We are in general of the ſame opinion with our correſpondent; but in ſome caſes, a philoſophical explanation of the operations of nature, which (apparently) ſeem to contradict each other, will be found neceſſary and uſeful, as well as entertaining to ſuch of our readers as have ſtudied agriculture as a ſcience.

To give a full anſwer to your printed queries, would make a ſmall volume; and as I have at preſent but little time to ſpare, I ſhall only hint at ſuch of them as are moſt generally important. Of theſe, Turnips claim our firſt attention, as being the baſis of all good huſbandry.

The moſt certain way that I have found of getting a good plant, is to make the land clean and fine as ſoon as the weather will permit, and to ſow four pints of ſeed per acre. It may be juſtly objected, that if the fly does not take them, the plants will be ſo thick, that they cannot be eaſily hoed. This I will readily grant; but they may eaſily be thinned in that caſe, and made fit for the hoe, by harrowing them firſt. But when you ſow only a pint per acre, and the fly takes them, there can be no expectation of a crop. When I have ſown four pints of ſeed, I have not in one inſtance, as I remember, miſſed of a plant, although the fly has ſometimes deſtroyed more than half of them, and much damaged the other.

One of your correſpondents has given you a good account of his manuring his land well to make the turnips grow quick, thereby ſpeedily to get into the rough leaf, in which ſtate the fly will not touch them. But every farmer who ſows a large quantity of turnips may not have it in his power ſo to do; though every one can ſow a ſufficient quantity of ſeed for the fly and himſelf too. Take this as a hint of my thoughts on the drill-huſbandry.*

I have known many great loſſes ſuſtained for want of a good plant of corn; but very little loſs by its being too thick: we can eaſily thin any corn, grain, or ſeed, when young, but we cannot ſo well add to it. Now, we are certain that all corn, grain, or ſeed, have many enemies that prey upon it; and the only way I know of to guard againſt them, is to keep the land ſweet and clean by good tillage, and ſow it full thick enough, rather than too thin; for although a thin plant may in a favourable ſeaſon turn out a good crop, yet it is liable to many damages more than a thick one. Among theſe are the mildew, the grub or ſlug; and many inſects will eat it rather than weeds; and it will alſo be choaked with weeds if not well hoed, which is an expence and trouble that indolent farmers will not readily ſubmit to.

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* We clearly perceive that our correſpondent is not a friend to the drill-huſbandry. This, we apprehend, proceeds from his not attending with his uſual accuracy to the many inconteſtible advantages reſulting from this improved mode of Agriculture. He has indeed fully granted the principles on which the drill-huſbandry is founded, by recommending the land to be "*kept ſweet and clean from weeds*;" but he ſeems not to have recollected, that this cannot by any expence or labour be ſo eaſily done in the broadcaſt, as in the drill-huſbandry.

I cannot help remarking what one of your correſpondents ſays in the firſt volume of your ſelect papers,* "that the time has been when a farmer would carry a cruſt of bread in his pocket to market, and get a pint of three-half-penny beer there, and jog home contented." What made me take notice of it was, that it breathes the ſame ſpirit manifeſted by a great land-ſteward in our neighbourhood, who cannot uſe one inſtrument in Agriculture, and has but little feeling for farmers: as though any thing were good enough for them; and as though farmers are, or at leaſt ought to be, made and uſed like beaſts of burden, loaded hard and abuſed at their pleaſure. Surely ſuch gentlemen (if they may be called ſo) never read that old-faſhioned book *the Bible*, in which we read, "Thou ſhalt not muzzle the mouth of "the ox that treadeth out the corn:" And that the huſbandman muſt or ought to be the firſt partaker of the fruits. But I hope there is no perſon in your Society who is actuated by ſuch a ſpirit;

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* We do not recollect this paſſage in any of the letters publiſhed by the Society.

for it appears to me quite contrary to the very profeſſion of encouraging Agriculture.

If a farmer takes a farm out of order, and the land be poor, the farmer, to improve ſuch a farm, and ſtock it well, ought in ſome caſes to have as much money to cultivate it to the beſt advantage as the land is worth; yet for ſuch a perſon, however induſtrious, a cruſt in his pocket is (in the opinion of ſuch ſtewards) good enough for him. And here I would aſk, Is any tradeſman in the like circumſtances ſpoken ſo lightly of? Is not an induſtrious careful farmer as reſpectable a member of ſociety as a tradeſman? Is he not at leaſt equally neceſſary to the well-being and happineſs of the ſtate? What muſt we think of ſuch men as ſay, (when a farmer rears a colt, and breaks it to make it fit for ſale) "The farmers ride ſuch "horſes, with high tails, that we cannot go the "road for them?"

And if a farmer happens to ſqueeze a lemon once a year, it is an unpardonable offence. This ſteward ſays, "His horſe ſhies ſo at the lemon "ſkins, that he cannot get near the door." And when he lets a farm, he has let it ſo dear, that he thinks it neceſſary to ſay to the young farmer, "If "you go home, and *work hard*, and *fare hard*, you "may get a living." I believe I may ſay with the greateſt propriety, that the ſame young man, by ſo doing, could get a better living without the farm than with it. And therefore would aſk you, Gentlemen, whether farmers ought to be ſo treated, or whether this is the right way to encourage Agriculture, and to improve the value of eſtates?*

As to inſtruments, I cannot tell what are uſed in your part of the kingdom; but I have heard that in Wales the ploughs are on ſo bad a conſtruction, that they cannot hold them themſelves to plough the land as it ought, without a driver. And I am informed by a perſon, a very good ploughman, who went into that country, that our ploughmen could not uſe them.

I hope the farmers in Somerſetſhire underſtand ploughing better than to employ a driver; for we are at no ſuch needleſs expence in our country.

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* We perfectly agree with this gentleman, that the methods of letting farms, which he ſo juſtly cenſures in this and a former letter, are very great diſcouragements to Agriculture: and of ſuch land-ſtewards as he has here deſcribed, we can only ſay, that the fewer there are of them, the better it will be both for the proprietors and the renters of farms. As there are no claſs of men more uſeful, there are none who deſerve more to enjoy the fruits of their labour, than farmers.

As to manures, thoſe which will exceedingly enrich one ſort of land will be of no ſervice to another; and this happens frequently to be a fact where there is a great ſimilitude to all appearance in the ſoil. Therefore, different experiments are neceſſary, and that on ſmall pieces for trial.

I am, Gentlemen, your's, &c.

April 28, 1783. J. L.

ARTICLE XLII.

Obſervations on Rhubarb, and its culture in England.

[By the late Dr. JOHN FOTHERGILL.]

GENTLEMEN,

VERY ſoon after I received your Secretary's letter, I was ſeized with a diſorder which rendered me incapable of attending to any thing but my own ſituation. I am now ſomewhat better, and hope, in the way to recover my uſual health.

The Rhubarb which has been chiefly cultivated in this country, as the true officinal Rhubarb, is undoubtedly the *Rheum Palmatum*. From the appearance of the root when properly cured, and from its effects when uſed as a medicine, it ſeems to approach very near to, if it be not really, the Rhubarb of the ſhops. Many trials have been made of it, and the reports of it are in its favour. Yet I own I have my doubts, and think it would ſcarcely be adviſeable to recommend a general culture of it.

There is ſomething in the native ſoil that imparts a virtue to plants which they ſometimes do not poſſeſs in other places.

Of all the objects of culture in this country, I ſhould leaſt of all be diſpoſed to promote the culture of drugs. What virtues they have, if they are good, we know pretty well; but as there is nothing more difficult in the courſe of practical ſcience, than to aſcertain the virtue or preciſe effect of any drug, ſo we may conſider that which is raiſed in an unnatural or different ſoil, as a medicine of untried virtue. It *may* be the ſame with that which we import; it may, however, be different in ſome latent circumſtance, and more or leſs operative, and muſt therefore ſubject practitioners to the riſque of diſappointment, or the ſolicitude of attending numerous experiments, when they have already a medicine at hand of the effects of which they are pretty certain.

We have three different markets, from ſome of which we may always hope to be tolerably well ſupplied with this drug; from Turkey, Ruſſia, and the Eaſt-Indies. The kinds are in ſome reſpect different, but the differences are generally underſtood.

In all other important articles which can he raiſed better and cheaper than thoſe we import, by all means let us cultivate them, and with aſſiduity. Whatever other nations can raiſe and ſell cheaper than we can do, and are willing to exchange for our manufactures, let us import from abroad. This is the baſis of juſt policy and œconomy.

Be pleaſed to excuſe this prolix anſwer to a ſimple pertinent queſtion, and believe that I am, with great reſpect,

Your friend,

JOHN FOTHERGILL.

London, Jan. 12, 1779.

ARTICLE XLIII.

On the Care neceſſary in planting Potatoes.

[By a Gentleman of Briſtol.]

SIR,

WITH a deſign to promote the views of the Society, I take the liberty of communicating to you a thought which ſome time ſince occurred to me reſpecting the cultivation of Potatoes. It ſtruck me, that to ſelect the very prime part of a crop might be a probable means of preventing that general diſeaſe known under the name of the *Curl*, and which is a ſure prognoſtic of a poor, dwindling crop.

Many ſchemes have been propoſed as likely to remedy this evil, but hitherto without ſucceſs; nor have I obſerved that any one has recommended this method, which to me, at firſt ſight, appears ſo feaſible.

Intelligent farmers are particular, and even curious, in the choice of their ſeed-grain. But in reſpect to potatoes choſen for planting, they are moſtly the rubbiſh of the crop.

Upon what principle this method is adopted it is hard to imagine, unleſs it be to ſave the inconſiderable trouble of cutting the ſets.

The ſeed potatoes ſaved in like manner from the crop of this rubbiſh, it appears obvious, muſt be continually degenerating, till at length they will no more anſwer the trouble and expence of cultivation. Hence farmers are driven to the neceſſity of purchaſing their ſeed potatoes at an expenſive rate from diſtant parts of the kingdom; the ſupply alſo is precarious, and good ſeaſons for planting are frequently loſt.

It is true, the potatoes ſo purchaſed generally yield a favourable crop, with a ſuitable management and a proper ſoil. But probably this ariſes from the very circumſtance to which I allude; namely, their being the prime produce of ſuch places from whence they are brought. This is indeed the fact, and a very natural one; for is it likely that an inferior kind would be ſelected for the purpoſe of ſending a great diſtance for ſale, eſpecially of ſuch an article as potatoes; the expences upon which, ſuch as freight, loading, unloading, &c. are very high in proportion to their value?

Should theſe hints merit the conſideration of the Society, it would be ſuperfluous in me to ſuggeſt any mode for bringing them to the teſt of experiment. I can only ſay for myſelf, that I intend to prove it; and being ſomewhat ſanguine as to its ſucceſs, I mean it to be on a pretty extenſive ſcale. Perhaps I may try three or four acres with ſome very fine potatoes I have by me, the produce of this ſeaſon, from Scottiſh ſets.

Wiſhing the utmoſt ſucceſs to your excellent inſtitution, I am, Sir,

Your moſt obedient ſervant,

Dec. 2, 1782. A SUBSCRIBER.

ARTICLE XLIV.

A Method of ſowing Turnip-Seed to prevent the Fly from taking it.

GENTLEMEN,

HAVING lately been informed of the following diſcovery, and thinking it highly deſerving to be publickly known, I take the liberty of communicating it to your Society.

About Midſummer, take the firſt opportunity when it rains, or there is an apparent certainty of rain approaching, to ſow your turnip-ſeed, if about the full moon the better. In this caſe neither harrow, bruſh, nor roll, after ſowing. The natural heat of the ground at that ſeaſon, and the conſequent fermentation occaſioned by copious rain, will give an aſtoniſhingly quick vegetation to the ſeed, which in a few days will be up and out of all danger from the fly. At all events, ſow not till it rains; it is better to wait a month, or even longer, for rain, than to ſow (merely for the ſake of ſowing about the uſual time) when the ground is parched with heat. By the ſcorching of the ſun, the oil and vegetative quality of the ſeed are exhauſted; and the few weak plants that come up will be deſtroyed by the fly, before they can attain ſtrength to put forth their rough leaves. The fly infeſt the ground abundantly in dry hot weather, but do no injury in rain.

The falling rain will ſufficiently waſh the turnip ſeed into the ground without harrowing it in, which, inſtead of merely covering, too often buries this ſmall ſeed at ſo great a depth as that it never afterwards gets above ground.

I am, your's, &c.

Exeter. C. GULLET.

ARTICLE XLV.

On the different Species of Rhubarb.

SIR,

I Did not know that the *Rheum Rhaponticum* was *now* judged by any to be the officinal rhubarb. The famous Naturaliſt and Siberian Traveller, M. PALLAS, ſeems to have determined the *Ruſſia* rhubarb to be the *Rheum Palmatum*; and that the *Chineſe* rhubarb is the ſpecies which *Linnæus* once thought to be the *true* rhubarb, and deſcribed as ſuch in the *Amænitates Academicæ*, under the name of *Undulatum*.

I have difficulty to believe that Monſ. PALLAS's intelligence on this ſubject is not to be depended on; though indeed, it is not ſtrange, that two or more ſpecies of the ſame genus ſhould produce roots but little different in their powers; which is the caſe in the inſtance before us of the *Palmatum* and *Undulatum*, if one may depend on letters and authors. And I have been informed, that theſe two ſpecies, planted near each other, will produce a mongrel plant, the ſeeds of which are not fertile; and I ſhould not be ſurprized to hear that the root of this *hybrid* excelled that of its parent plants.

Bergius, the lateſt author on the *Materia Medica* that is come to my hands, tells us, that the *Chineſe* get up their rhubarb roots in winter. He himſelf adviſes the taking them up in autumn, and ſays they require to be eleven or twelve years old.

But I have learned that Dr. Hope thinks them ſufficiently good at the end of four or five years; and the author above-mentioned tells us, that the young roots are more purgative, and that the older ones are more aſtringent.

Experiments only can determine what ſeaſon of the year is preferable to take up the roots in. I cannot ſpeak from any knowledge on this ſubject; but ſhould incline to give it in favour of the ſpring, or the time before the plant begins to puſh its leaves; though I am ſenſible that this will not hold in theſe bulbous or tuberous kinds, which form a new root annually, as ſoon as the plant is perfected.

I am, very reſpectfully,

Your humble ſervant,

March 2, 1783. R. PULTENEY.

ARTICLE XLVI.

On the Culture and Increaſe of a new Species of Horſe-Beans ſent from Holland.

GENTLEMEN,

ON the 12th of March laſt, I received from a Member of your Society, two quarts of a new kind of ſmall horſe-beans, ſent him from Holland. They weighed exactly four pounds. As I did not receive them till all my other beans were planted, I had but little time to prepare the land for this experiment.

The ſpot I fixed on was part of a very large field intended for turnips, and meaſured nearly forty-five perches. As it was very long and narrow, the ſoil varied greatly, one end being a heavy ſand, apt to run together and bind, when much rain ſuddenly follows the time of working it. The other end I am quite at a loſs to name, it being a rude compound of clay and rugged ſtones, whoſe ſurface for roughneſs reſembles a cinder, and greatly obſtructs the point of the ſhare in ploughing. In general this land is very wet, but this ſeaſon ſo dry, that it was ploughed with great difficulty; and this part only had a ſmall quantity of dung in conſideration of its extreme poverty.

The whole was a wheat-ſtubble ploughed in before Chriſtmas, and on the 15th of March ridged up in order to be planted, which was performed on the 17th with the chain in rows three links and a half diſtant, and two links from bean to bean in the rows; for they were planted ſingly, ſo that a ſpace of ſeven ſquare links, or three ſquare feet, was allotted to each bean.

When about ſix inches high, they were hoed, and earthed up a little, but in a very bad manner, the ground being rough and hard, which rendered the work very tedious.

The weeds grew amazingly, but notwithſtanding they poſſeſſed ſo large a ſhare of the ground, the beans were in general five feet high, having from twenty to ſeventy pods on a ſtalk. I counted the number from one ſingle bean, and found them to be 114, which, allowing on an average three beans and a half to a pod, is 399.

The crop was cut on the 28th of Auguſt; but being very green, they were continued in the field to the 4th of September, and were then in fine order. I had them threſhed about ſix weeks ago, and they yielded thirty-five gallons Wincheſter meaſure, and weighed 296 lb. nett of fine beans, not much the worſe for being cut ſo green, though I apprehend ſomewhat leſs both in weight and meaſure.

I now beg leave to obſerve,

1ſt. That as greater regard was paid to the value of the ſeed than to that of the land, a much leſs quantity was ſown than might have been raiſed on the ſame ſpace of ground. And as little benefit was likely to be derived from tillage or manure, I flatter myſelf the *air* might in ſome degree ſupply the deficiency, by ſtrengthening the bloſſoms, and preventing blights.

But whoever makes ſmall experiments of this kind lies under greater diſadvantages than would attend them on a larger ſcale, eſpecially where the proportion of ſeed is ſo ſmall, that every grain deſtroyed by vermin, &c. is miſſed. And altho' ſeventy-four for one is a great increaſe, yet fifteen buſhels and a half per acre is not a profitable crop of beans.

2*dly*. I judge this ſpecies of beans in general to be a great bearer, and hardy, as the dry weather did not apparently effect them, although they ſtood ſo thin.

As this bean puts forth a ſtrong ſtalk, and ſhoots high, it will require to be planted thinner than others, and as early as poſſible; otherwiſe I fear that in wet ſummers it would not ripen in due ſeaſon for a wheat crop to follow, eſpecially on moiſt land. Perhaps a buſhel on an acre may be fully ſufficient.

I am, &c.

Grittleton, Wilts, JAMES SARGENT.
Oct. 29th, 1779.

ARTICLE XLVII.

Obſervations on Dr. Tiſſot's Letter to Monſ. Hirzel.

GENTLEMEN,

HAVING lately read Dr. TISSOT's letter to M. HIRZEL, in anſwer to M. LINGUET's Treatiſe on Bread and Bread-corn, gratitude ſeemed to require not only an acknowledgment of that great man's abilities, but alſo the juſt tribute due to the philanthropy of his amiable diſpoſition, which renders him ever ſtudious to promote the good of mankind. Not forgetting, at the ſame time, the thanks due to the Bath Society for their laudable attempt to encourage, extend, and promote, the knowledge of Arts ſo univerſally beneficial as thoſe of Agriculture, Planting, &c.

One cannot help being ſurpriſed that this great man ſhould enter into the minutiæ of a ſcience ſo remote from that of his profeſſion, with ſuch accuracy and diſcernment; for how much ſoever he may have miſtaken ſome hiſtorical paſſages relating to the ſubject, his reaſoning from facts and experience is certainly juſt, and applies as truly to the practice of Great-Britain, as the country in which he wrote. The following remark is very important and juſt, and well worthy the practical farmer's attention here, as well as in Switzerland. He ſays,

"I am perſuaded from the beſt Treatiſes on Œconomics, from the obſervations communicated to me by perſons fully experienced in this matter, and from the ſoundeſt philoſophical principles, that in ſowing leſs corn, and putting the remainder of the lands to ſome other culture, there would be as much grain reaped, and alſo many other uſeful productions."

Had this gentleman profeſſionally ſtudied the œconomical ſtate of Agriculture in theſe our countries, he could not have pointed out more directly an evil which has long militated againſt the general intereſt of Great-Britain; I mean that of giving encouragement to the planting of more wheat than could be diſpoſed of, without laying a heavy tax upon the people at large; and not only at a price too by which the community have been great ſufferers, but greatly in many inſtances againſt the intereſt of the farmers themſelves, who have been induced to depart from their uſual routine of crops, to plant wheat in lands not proper for that grain, and to neglect thoſe which it would have borne with great advantage; by which both their own intereſt, and that of the publick, have been greatly injured; for it is a certain fact, that in ſome years, when 200,000l. have been paid for bounties, we have been obliged to import oats to the amount of 500,000l. amounting together to 700,000l. A ſum conſiderably above half what the wheat was ſold for, though it actually ſtood the grower in above three times the money!

It ſeems to have eſcaped the notice of all the writers on the ſubject, that whatever article of commerce is exported at a price below what it ſtands the grower or manufacturer in, a real ſubſtantial loſs muſt be ſuſtained by ſomebody. Now, ſuppoſing the average coſt of wheat to the farmer is four ſhillings a buſhel, and it be exported at three ſhillings, there is a loſs of twenty-five per cent. in the firſt inſtance; and ſeven-pence halfpenny per buſhel given by the bounty amounts to above twenty per cent. more, together above forty-five per cent. loſs: whereas, if kept till the next year only, it probably might have ſold for ſo much gain, as often would have been the caſe. But this is wide of the firſt intentions of this paper.

Dr. Tissot, after deſcribing the method of practice purſued by the wiſe Kliock, (as he, I ſuppoſe very juſtly, calls him) wiſhes him to add ſome corrections and amendments to his ſyſtem of Agriculture.

1*ſt*. Never to ſow wheat with rye: The impropriety of this practice is too glaring to need enlarging upon.

2*dly*. Never to let graſs ſtand too long before it is mown; *firſt*, becauſe it has been fully proved, that hay is leſs nouriſhing to animals, when it comes to ſeed; and *ſecondly*, as ſoon as the bloſſom drops, the plant is nouriſhed wholly from the roots, which impoveriſhes the land. This, though not leſs certain than the former, is in general little attended to by the farmer; indeed moſt of them act in direct repugnancy to it, for it is a maxim almoſt univerſally received, that the largeſt crop of every kind is the beſt. Therefore in hay and fodder, quantity in general is preferred to quality. Often the former has ſo much the preference of the latter, that the deſire of a large crop procraſtinates the cutting till the hay is ſpoiled, and in fact the whole crop loſt; for it too often happens that it is not worth the expence.

What Mr. Tull aſſerted of what he called his virgin-hay, (ſpeaking of ſainfoin) may with equal truth be ſaid of all kinds of graſs whatever; every ſpecies of which, whether natural or artificial, intended for fodder, is in the higheſt degree of perfection for that purpoſe when the plants are in bloom. They then contain all the virtues of the plant in its higheſt perfection; and one load cut at that ſeaſon, if well cured, is worth more than two that ſtand till the flowers are dropped, the bottom turned yellow, and dying, which in that caſe contracts a rank diſagreeable ſmell that can never be entirely removed in the curing. And if in that ſtate bad weather ſhould happen, the ſeeds would be moſtly dropped before it could be got to the rick, and the hay not better than barley-ſtraw, if ſo good.

I would therefore adviſe every one, eſpecially all who make hay for their own conſumption, to cut as ſoon as the graſs is fairly in bloom, if the weather will by any means permit.

His laſt remark is reſpecting Sheep, which requires ſome conſideration. He recommends the keeping a greater number of ſheep. This muſt ever be determined by the nature of the ſoil, and the extent of the farm. He cautions againſt keeping them too hot, which is certainly right, for in extreme hot weather they ſuffer greatly.—But it does not follow, as he aſſerts afterwards, upon the authority of Monſ. D'AUBERTON, "that ſheep are neither hurt by cold, nor by ſnow, nor *rain.*" That they ſeldom ſuffer by a dry cold, though very ſevere, is very certain; nor by ſnow, unleſs it continues ſo long as to injure them, by depriving them of their food; but heavy or long-continued rains are certainly very injurious to them, eſpecially to lambs in October and November, when the winter rains ſet in. Of the truth of this I am well aſſured from my own obſervation.

In autumn 1780, I went into the north of Devonſhire, to ſpend a few weeks with a gentleman who cultivated his own eſtate. In October, when the cold rains came on, for many days running, he had one or more young ſheep or lambs brought in, either dead, or in a dying ſtate. They were one and all much ſwoln in the body, without any other viſible difference from thoſe that were well. In the field, I obſerved, they were much inclined to lie ſtill, till rouzed and put up. I had ſeveral of them brought home and laid by the fire-ſide, and made ſeveral experiments upon them, but without ſucceſs. At length, I had two or three of them opened, to ſee if I could diſcover any internal cauſe of their malady. All the viſcera appeared to be ſound and perfect, without any the leaſt ſign of diſorder; only, as I ſaid, the body was greatly ſwoln.

When the knife entered the belly, there flew out a great quantity of rarefied air, with a conſiderable noiſe, upon which the body immediately fell to its natural dimenſions. As no unſoundneſs appeared in any of the viſcera, I conceived the expanſive vapour was probably the cauſe of the diſorder, and the effect of obſtructed perſpiration, occaſioned by the cold rains ſo common at that ſeaſon. Upon enquiry, I found the diſorder was common in Devonſhire at that ſeaſon of the year, and at that time was very rife for many miles around, which confirmed my ſuſpicion as to the cauſe of the diſorder.

About ſixty of theſe lambs remaining, I propoſed to the hind [bailiff] to try if we could not preſerve the remainder by ſheltering them from the cold rains and damps of the night, by putting them into an airy barn, which was contiguous to the fields, to remain there till it might be thought proper to let them out in the morning. This effectually anſwered the purpoſe, for not one miſcarried afterwards. In three or four days time, their coats, which appeared of a waſhed ſickly white while they lay out, became a natural healthy-looking yellow, and they appeared as lively and healthy as at any time of the year. I ſhould therefore hope, if this method be purſued, many thouſands may be preſerved by its means.

Were I a farmer poſſeſſed of a conſiderable flock, I would certainly erect a proper building for the purpoſe. It might be done at very little expence, and a large quantity of manure got from it, eſpecially if the floor were covered with an abſorbent earth, or ſand with ſtraw over it.

By this means, all their urine and dung might be ſaved, which would be a great acquiſition; as in common, for the moſt part, it is dropped under hedges, or upon the ſurface of the land, where the ſun and wind readily exhale its fertilizing juices, with little or no remaining benefit to the ſoil.

Such a building would be as ſalutary a defence againſt the ſcorching and waſting heats of ſummer, as againſt the unhealthy and ſtagnating rains of winter. In deep ſnows it would be a very proper place to fodder in, and ſalt-licks might be provided under its cover for the ſheep at all times to reſort to. 'Tis ſaid in Spain theſe ſalt-licks are common, and that the cattle reſort to them either through inſtinct, or from having contracted, by example and habit, a liking to ſalt.

Such a building would alſo be very uſeful for large cattle, with an opening on the moſt ſheltered ſide large enough for two to run in a-breaſt without injury. It might be thatched and wattled [herdled or ſtaked] on the ſides and ends, which would be warm enough, the cattle being left at liberty to go in and out at pleaſure; by which means they would equally avoid the violent heat and haſty ſtorms of ſummer, and the ſoaking rains and chilling blaſts of winter.

This method is, perhaps, the very beſt means of keeping cattle healthy which are not in conſtant work, and of collecting a very large quantity of manure on or near the ſpot where it is to be uſed. For the dung and ſtale which is dropt under hedges, or in the field promiſcuouſly, is of very little uſe in ameliorating the ſoil.

I conclude with every good wiſh for your laudable undertaking; to the promotion of which I ſhould eſteem myſelf happy to be able in any meaſure to contribute.

I am, Gentlemen,
Your moſt obedient ſervant,

Mancheſter, JOS. WIMPEY.
April 10, 1782.

ARTICLE XLVIII.

General Hints relative to Agriculture.

[By an Honorary Member.]

GENTLEMEN,

I MUST acknowledge my long remiſſneſs in making you any return for the honour you have done me, by adding my name to the liſt of honorary members; but the diſtance of my reſidence, added to an indifferent ſtate of health, muſt plead my excuſe. But in order to convince you that the important objects of your attention have not wholly eſcaped mine, I beg leave to trouble you with a few general hints on huſbandry, which are entirely ſubmitted to your diſpoſal.

The great outlines of good huſbandry are the ſame in all counties, and will admit of little variation. It is in *leſſer* matters that any material difference ought to be made. And as theſe differences are local, they can only be judged of properly by the reſpective inhabitants.

The vaſt tracts of waſte land which ſtill remain in almoſt every county, are a publick reproach to the grand police of this nation, and evince a degree of ingratitude to the great Author of Nature; who has bleſſed us with the means of rendering them ſources of wealth to numbers, and the theatre of employment to our poor labourers; many of whom, from the decline of our commerce, are almoſt deſtitute of bread.

The low lands in moſt counties are beſt adapted for paſture. The graſſes moſt natural to them are better kinds than in elevated ground. Thoſe which, from being ſituated along the ſides of rivers, are moſt rich and leaſt liable to be affected by drought, ſhould never be ploughed, unleſs for hemp, flax, or cole, [rape.] For corn will ſuſtain drought better, even on high lands, than graſs of any kind worth ſtanding for hay.

Lands that are moderately ſituated with reſpect to height and water, are beſt for corn; but ſuch lands ought alſo to be laid down to graſs once in ten or twelve years. By thus treating them they recover their ſtrength, which, through a long courſe of ploughing, will, in ſpite of all your manure, become feeble and exhauſted. I am of the opinion, that if moſt arable lands were laid to graſs once in ſix years, greater profit would ariſe to the farmer. For if we compare the produce of forty acres, that are an equal number of years in graſs and corn, with the ſame extent of land equal in quality, and ſucceſſively ploughed for the ſame length of time, we ſhall find that (beſides the extra goodneſs of the crops gained by the former courſe) the land thus managed requires much leſs ſeed, and there is much leſs conſumption of corn on the farm than in the latter. To this it may be added, that every pound of fleſh added to the cattle fed in the graſs years, is worth two or three pounds of grain, both to the farmer and to the publick. Therefore, if, on the lands in corn, and graſs alternately, the crops of corn are only one-fourth better than on lands always in corn, this plan is far the moſt beneficial, and produces a greater plenty of food for ſociety.

When corn is raiſed on a ſoil naturally wet, winter grain ought to be the principal object of the farmer's attention. For, on ſuch ſituations, the natural wetneſs of our winters will often render it almoſt impoſſible to get the land in a proper condition to be well ploughed for ſpring corn. The Lincolnſhire barley will anſwer very well ſown on a winter furrow; as will oats; and ſome kind of peaſe.

In every caſe, when you intend to lay down, ſow graſs ſeeds with the laſt crop. This method will enable the farmer to deal in and to breed a larger number of cattle than he otherwiſe could do. The reaſon of this is evident. As his cattle are employed only a part of the year, he may buy and ſell with advantage, and without loſs of labour.

The providing of food for ſociety is, of all employments, the moſt important, and the moſt honourable. By other occupations, the wealth and the power of a ſtate may be more rapidly increaſed; but this is neceſſary to its very exiſtence. In proportion to the largeneſs of the quantity of eatables brought to market, the more eaſily is the manufacturer maintained, of the leſs value is his labour, and the lower the price of the manufacture that he works. By theſe means the ſale of the goods made increaſes abroad, and their improvement is encouraged at home.

Of all articles in trade, none is ſo valuable as corn. It is a commodity of all others the moſt important. A nation that ſupplies another with corn, makes that other pay her labourers, and contribute to the increaſe of her wealth and power.

Theſe are *obvious* truths: but perhaps the revival of them in a work of the kind you are about to publiſh may not be wholly uſeleſs.

Wherever Agriculture flouriſhes in the greateſt perfection, it is generally carried on to more advantage by tenants, than by the owners of lands; becauſe the cuſtoms of the country direct the management; all depends on care, attention, and induſtry, and theſe are oftener found in tenants than in proprietors. In this caſe it is alſo of little conſequence whether the farms are large or ſmall.

But where Agriculture is little underſtood, and badly practiſed, it is generally beſt carried on in large farms, and by the owners of them.

Improvements muſt firſt begin among men of property, who have large farms. The tenants of ſmall farms cannot run riſks, by making untried or doubtful experiments; but the tenants of large farms may, as they are generally more wealthy, and more capable of judging from cloſe obſervation. A little loſs by unſucceſsful experiments will not materially injure them; but ſtill it cannot be expected that they will make improvements equal to land-owners, who are leſs influenced by prejudices and cuſtoms, and are better acquainted with improvements made in diſtant places.

There appears to be a great remiſſneſs in our common farmers' general method of treating their ſummer fallows. After theſe have been once ploughed, they are often let lie without a ſecond ploughing till many of the weeds come into flower, and even perfect and ſhed their ſeeds. By this ſhameful neglect, a freſh crop of weeds is ſown, and occaſion a great deal of future labour. Many farmers indeed take conſiderable pains, and are at much expence, to clear their lands of weeds when they ſpring up; but few, if any, take much care to prevent their ſeeding. Indeed, by this neglect being ſo general, and extending even to their very dunghills, one would be apt to think they forget, or know not, that weeds ſpring from ſeeds of the ſame kind. I have frequently heard them complain that their fields (when contiguous to commons that abound with thiſtles) are overrun with thiſtles; and yet they ſuffer them to be annually ſown with this pernicious weed, rather than be at the trifling expence of employing a poor man two or three days in cutting them down on the common before their ſeeds ripen. How truly ridiculous is ſuch conduct! Nor is it leſs ſo to let their dunghills remain covered with thiſtles, docks, and many other weeds, till they have all ſhed their ſeeds, and then wiſely ſow their own lands with them when the manure is ſpread.

The ſame may be ſaid of ſuffering ſuch quantities of them to ſtand and ſhed their ſeeds, many of which the wind diſperſes into the adjoining fields.

In the latter caſe, the cutting and burning them would be well repaid by the aſhes. I have known poor men in this county, who, during the months of July, Auguſt, and September, have earned 2s. 6d. a day by cutting and burning weeds in our highways, and ſelling the aſhes; which, if the weeds are burnt without being ſuffered to flame, are very fine manure, eſpecially for cold wet lands. I obſerve you have very judiciouſly offered a premium on this head, which will doubtleſs have a good effect.

The practice of ſowing *ſpring wheat* has of late years increaſed in many places, but not much with us, although in the few inſtances tried it has ſucceeded very well. This method has one advantage, to wit, that of affording time for the land to receive the influence of froſts, and to be got in finer tilth than it could be if ſown in autumn. The plants are ſeldom ſo vigorous, but the ears are as well filled, and the grain as large, as when ſown in October or November. This, on the whole, ſeems an advantage; for if early ſowing be a means to increaſe the bulk of the ſtraw, it muſt for the ſame reaſon leſſen the quantity of grain. Nor is this all: Autumn ſown wheat is in greater danger by ſpring froſts. The froſt affects every plant more or leſs; and the farther it is advanced in its growth, the more froſt injures it, A degree of froſt deſtroys a plant of wheat when near or in the ear, which affects it very little in the winter.

I think the beſt ſeaſon for ſowing wheat in autumn, is from the 1ſt of October to the 10th of November. After that time there is great danger of being interrupted by heavy rains or froſt; both which are very prejudicial to the ſeed in the firſt ſtages of its vegetation. In proportion as the land is more clean and fertile, a leſs quantity of ſeed is neceſſary. The reaſons for this are too obvious to need explanation.

I am, your very humble ſervant,

Norfolk, March 6, 1783. S. B.

ARTICLE XLIX.

Obſervations on the beſt Method of reſtoring worn-out Soils without Manure.

[By a Gentleman Farmer in Dorſetſhire.]

GENTLEMEN,

THE firſt thing neceſſary on worn-out lands is, immediately after harveſt, to turn them up with the plough as deep as poſſible. In order to do this effectually, it will ſometimes be needful for a ſecond plough to follow the firſt in the ſame furrow; which will throw the mould over, and bury the ſtubble and weeds. In this caſe there will be a new ſoil uppermoſt, which being freſh to the air, will receive much greater and more laſting benefit from the ſun, the rain, and the froſts, than it otherwiſe could do, as thereby it will attract a greater quantity of the nutrition which theſe afford. The ſtubble and weeds, being by this method of ploughing buried deep, will much ſooner rot than when juſt covered. In this ſtate the ridges will lie high, and if the land be wet or of the brick-earth kind, will be full of clots or large lumps.

No time ſhould now be loſt by delaying to render this newly turned up ſoil as fine as harrowing can make it. I know in this particular my judgment will be called in queſtion by numbers. Common farmers will ſay, "To what purpoſe "is all this expence and labour, when, if the "land be ſuffered to lie in its rough ſtate "through the winter, the froſt and the rains will "do the work for you?" But this is the language of the ſluggard, and the inexperienced huſbandman only.

I am convinced, by repeated experiments, cloſe obſervation, and plain reaſoning on known facts, that lands which are made fine before the ſharp froſt and winter rains come on, will receive a much greater ſhare of their influence than any other.

If the land be left in a rough ſtate, there is ſeldom time for the rains and froſt to affect more than the outſide of the large clods or lumps: the outſide will indeed be pulverized, but the *middle* of the lumps, wherever they are large, will be found nearly in the ſame hard ſtiff ſtate as when turned up by the plough. Hence it muſt appear to every one, that in this caſe the benefit of air, winter rains, and froſts, on lands thus left, is partial; and the conſequence is, that harrowing it in the ſpring, when theſe are over, is too late for its receiving the benefit which would have accrued from them, and the power of vegetation is not ſo vigorous.

But to make winter fallows as fine as they can be in autumn, and then ridge them up in that pulverized ſtate, is acting moſt agreeably to nature. The greateſt poſſible quantity of ſurface is by this means expoſed to the atmoſphere; and the ſand is left in a ſtate wherein the rains and the froſts are moſt eaſily admiſſible. They will then penetrate and enrich the whole maſs to a greater depth.

If the froſt penetrates a quantity of earth, formed into a large hard clod, *partially*, on account of its bulk and hardneſs, (which is always found to be the caſe) it is evident that the ſame clods broken into four parts would be thereby penetrated four times as much, or, in other words, four times the quantity of earth would be affected by it, and on a thaw be pulverized. For we find, that after the breaking up of a ſevere froſt, all the ſmall clods crumble eaſily into powder; while the large ones are only made ſmaller by the crumbling off of their ſurface to a certain depth.

By this deep ploughing which I have recommended, the worn-out ſoil being turned in, the ſecond ſtratum or freſh earth is now uppermoſt; and having, by being made as fine as it can be in autumn, been expoſed to the air, the rain, and the froſt during winter, is thereby ſweetened and cleanſed of its impurities, and thus becomes a new freſh fertilized earth, in the beſt poſſible ſtate for vigorous vegetation.

Many farmers will probably object to this method, on account of its being attended with a little extra expence: But I wiſh them to conſider, *firſt*, that this expence is more in appearance than reality, for leſs labour is requiſite in the ſpring; and *ſecondly*, that it will be amply repaid by the goodneſs of ſucceeding crops.

About ſeven years ſince I made a comparative experiment of this kind on a field of ten acres, the ſoil of which was equal as poſſible in goodneſs. The one half of this field I left, after ploughing, in its rough ſtate, the ſurface being covered with large hard clods. The other half I made as fine as poſſible by harrowing with ox harrows, and beating in pieces the hardeſt and largeſt clods which the harrow would not break.

In the ſpring, the part I had harrowed was much finer, without any additional labour, than I could render the other (which was left in its rough ſtate) by repeated harrowings; for the rain and the froſt not having penetrated the middle of the large clods, they had received no benefit therefrom, and were as hard as bricks, being only leſſened in ſize.

I ſowed the whole field with barley the laſt week in April, and threw nine pounds of broad clover in with it. On harveſting it, I kept the crops ſeparate: The part left rough produced twenty-four buſhels per acre; the other thirty-one; the latter by much the fineſt ſample. The crop of clover next year was equally in favour of the method I am recommending, being heavier by near half a ton per acre.

The extra expence on this part was only about eight ſhillings per acre; the extra produce yielded an extra profit of more than twenty ſhillings per acre.

I am, Gentlemen, your's, &c.

A LANDHOLDER.

ARTICLE L.

On the comparative Utility of Oxen and Horſes in Huſbandry.

Rougham near Bury, Suffolk, Dec. 17, 1781.

GENTLEMEN,

AS one of your queries to the High-Sheriffs reſpected the comparative utility of horſes and oxen in huſbandry, I wiſh to ſubmit the following facts to your conſideration:—

About five years ago, I took ſome land into my occupation, and having found the expence of horſes very great, I determined, ſomewhat more than two years ago, to make trial of oxen, and bought one pair. At that time, I am almoſt certain, there was not an ox worked in this county;

on which account my workmen added much to the trouble of breaking them, by their obſtinate prejudices againſt the uſe of them.

At laſt I was fortunate enough to ſelect a labourer, who, though totally unuſed to them, was willing to take proper pains to break them. By his good treatment and temper, they ſoon became tractable, and as handy both at ploughing and carting as any horſes.

Being well ſatisfied with their performance, I reſolved to diſpoſe of all my draft horſes, and ſubſtitute oxen in their ſtead. I have now compleated my plan, and have not a ſingle cart-horſe; but the work of my farm (which conſiſts of upwards of one hundred acres of arable land, and ſixty of paſture and wood) is performed with eaſe by ſix oxen; together with my ſtatute-duty on the highways, timber and corn, carting, harrowing, rolling, and every part of rural buſineſs. They are ſhoed conſtantly: their harneſs is exactly the ſame as that of horſes, (excepting the neceſſary alterations for difference of ſize and ſhape) they are drove with bridles, and bits in their mouths, and anſwer to the ſame words of the ploughman or carter as horſes, and as readily. A ſingle man holds the plough, and drives a pair of oxen with reins; they will regularly plough an acre of land, every day, and in leſs than eight hours time; I believe they will do it in ſeven, but I would not aſſert more than I know they perform.

I have a ſmall plantation, in which the trees are planted in rows ten feet aſunder; the intervals are ploughed by a ſingle ox with a light plough, and he is driven by the man who holds it. I mention this as an inſtance of their great docility.

My oxen go in a cart ſingle, or one, two, three, or more in proportion to the load. Four oxen will draw eighty buſhels of barley, or oats, in a waggon, with eaſe; and if they are good in their kind, will travel as faſt as horſes with the ſame load.

I frequently ſend out eighty buſhels of oats with only three oxen; and forty buſhels with one ox, in a light cart, which I think of all others the beſt method of carriage. My workmen are now perfectly reconciled to the uſe of oxen; and the following reaſons determine me to prefer them greatly to horſes:—

1ſt. They are kept at much leſs expence.—Mine never eat corn or meal of any ſort. During the winter, they are kept in good order for work upon ſtraw, with turnips, carrots, or cabbages; for want of either of the three latter, I allow one peck of bran a day to each ox, whilſt in conſtant work. When my ſtraw is finiſhed, and the ſpring advances, they eat hay; and if they work harder than common in the ſeed time, they have bran beſide. When the vetches are fit to mow and give them in the ſtable, they have nothing elſe. After the day's work in the ſummer, they have a ſmall bundle of hay to eat, and ſtand in the ſtable till they are cool, and are then turned into the paſture.

I am of opinion, that the annual difference of expence in keeping a horſe and an ox, each in condition for the ſame conſtant work, is at leaſt four pounds.

2dly. The value of a horſe declines every year after he is ſeven years old; and is ſcarcely any thing if he is blind, incurably lame, or very old. But if an ox is in any of thoſe ſituations, he may be fatted, and ſold for much more than the firſt purchaſe; and will always fat ſooner after work than before.

3dly. They are not ſo liable to illneſs as horſes. I have never had one indiſpoſed.

4thly. Horſes (eſpecially thoſe belonging to gentlemen) are frequently rode by ſervants without their maſter's knowledge, and often injured by it. Oxen are in no danger of this kind.

5thly. A general uſe of oxen would make beef, and conſequently all other meat, more plentiful; which I think would be a national benefit.

That it may not be thought, that a pair of oxen will plough an acre of land in a day only upon a very light ſoil; I muſt add, that the greater part of my arable land is too heavy to grow turnips to advantage. When my lighter lands are in fine tilth, I make uſe of a double plough; a ſingle man holds it, and drives one pair of oxen, and will plough two acres a day.

I am well aware, that the method of working oxen with a yoke ſpares a conſiderable expence in the article of harneſs; but they move ſo much more freely with collars, and can be uſed with ſo much more advantage ſingly by the latter method, that I think it far preferable.

After experience has inclined me to give the preference to oxen, I will not omit in my account the only material inconvenience I have found in working them; which is, they are troubleſome in ſhoeing, at leaſt I have found them ſo in this country; and, I believe, chiefly becauſe my ſmith never ſhoed any before. I have them confined in a pound whilſt they are ſhoed, and a man attends the ſmith. However, I think this diſadvantage amply recompenſed by more material advantages; and can with great truth affirm, that the longer I have worked oxen, the better I have been ſatisfied with them.

With great reſpect, I am, Gentlemen,

Your moſt obedient ſervant,

R. KEDINGTON.

ARTICLE LI.

Sir JOHN ANSTRUTHER having very politely preſented to the Society a complete Model and accurate Drawing of a Drill-Plough of his own conſtruction, for ſowing the different kinds of Grain, was pleaſed alſo to communicate therewith the following Obſervations:

GENTLEMEN,

THE ſlow progreſs which the Drill-Huſbandry has made in many parts of Great-Britain ſince Mr. TULL's time, has principally been owing to the want of proper drill-ploughs; there being few yet contrived which are not too expenſive, or of too nice and complicated a conſtruction to be made or repaired by common workmen.

This has alſo prevented trials from being made of the drill-culture, in ſo general a manner as to determine, by proper experiments, whether or not it was ſo advantageous as Mr. TULL has ſtated it to be.

It is more than thirty years ſince I began to uſe drill-ploughs; but finding thoſe I firſt procured good for nothing, and not being able to get a workman who could make one on TULL's plan, I found myſelf obliged to abandon the drill-huſbandry.

Before drilling can become general, drill-ploughs muſt be ſimple, and ſuch as a common ploughman, accuſtomed to uſe ſtrong inſtruments, can uſe without breaking; and ſuch alſo as common workmen can eaſily make or repair.

Mathematical accuracy, however, is not required for delivering the ſeed; for it matters very little whether there be a quarter of a peck more or leſs ſown, if it be delivered with tolerable regularity.

Some

Some years ago I had a plough made of the ſame kind with the model and drawing which I have the honour of preſenting to your Society. It was made by a common ploughwright, and ſufficiently ſtrong for any land made fit for turnips or wheat. I have now uſed it for eight years, without its requiring any repair. It has been tried on very rough ground unfit for ſowing, in order to aſcertain its ſtrength.

Laſt year having read Mr. Forbes, upon the extenſive practice of the New Huſbandry, and ſome other authors, who gave a more clear and diſtinct account of the different operations in drilling than had heretofore been given, I wiſhed to try them, and to adapt my plough to ſow the quantities therein directed. It was, however, adjuſted to ſow a *ſmaller quantity*, and the ſeed was not ſteeped.

Not having ground ſo proper as I wiſhed, it was drilled on the ſide of a field, the ſoil of which was light and ſandy, and in ſuch bad order, that the preceding crop was a very indifferent one. It was therefore manured with a compoſt dung-hill.

After croſs-ploughing and manuring, it was laid into four and a half feet ridges, then harrowed and drilled with one peck and a half of wheat on an acre and a quarter, which is nearly one peck and a fifth per Engliſh acre. It was drilled the 27th of October, and rolled after drilling. The crop was late in its appearance, and very backward in the ſpring.

March 31ſt, it was horſe-hoed one furrow *from* the rows.

April 8th, it was hand-hoed and weeded *in* the rows.

25th, horſe-hoed again, laying a furrow back *to* the rows.

May 15th, hand-hoed the ſecond time.

June 2d, horſe-hoed *from* the rows.

June 12th, hand-hoed the third time.

July 14th, horſe-hoed *to* the rows.

At this laſt hoeing, as many of the ears were beaten down into the intervals by wind and rain, a man went before the horſe-hoe, and turned the ears back into their proper place.

The crop, when reaped and threſhed, yielded me thirty-ſix buſhels on one acre and a quarter, which is twenty-eight buſhels and three pecks per acre; and the produce from one peck and a half ninety-ſix for one.

As the produce appeared ſo great, from land in ſuch bad order, it was carefully meaſured again, and found to be right. But this increaſe, though great, was not ſo large as Mr. CRAICK of Glaſgow had without dung.

Mr. RANDAL ſays, "It is an experimented fact, that on a fine loam, exquiſitely prepared, one hundred and forty-four buſhels have been produced from one acre. And I believe, it is not known what the increaſe may be brought to in rich lands by high cultivation."

Some years ſince, I had beans dropt alternately with potatoes, at two feet diſtance in the rows, which were three feet apart, and ploughed in the intervals. The land adjoining was ſown with beans and peaſe, which were a good crop; but thoſe ſown among the potatoes a better one. I pulled one ſtem of the beans planted with the potatoes, which had three branches riſing from the bottom, and it produced two hundred and twenty-five beans. In all the trials of drilled beans, moſt of the ſtems had two branches, with many pods upon each.——From theſe and other inſtances, I believe it is not yet known to what increaſe grain may be brought by drilling, good cultivation, and manure.

Horſe-hoeing is certainly preferable to cloſe drilling or hand-hoeing; but the latter is ſuperior to broadcaſt.

Horſe-hoeing the full depth increaſes the crop, by making it tiller or branch more than it otherwiſe would do; and the advantage is diſtinctly obſervable every hoeing, by the colour of the grain. It prepares the ground for the next crop, at the ſame time that it increaſes the crop growing, which hand-hoeing does not, although it may deſtroy the weeds.

Thus drilled ground is kept in a looſe open ſtate to receive the benefit of the influence of the air and weather, which broadcaſt has not; and it is evident, from certain experience, that crops may be drilled many years to good advantage without manure.

Suppoſe the crops only twenty buſhels per acre, what courſe of broadcaſt crops will give 5l. an acre for the courſe?

But ſuppoſe they are dunged the ſame as any ground in the moſt approved courſe, there is the greateſt reaſon to expect as much as in the above experiment, which is twenty-eight and three quarters, and at five ſhillings per buſhel amounts to 7l. 3s. 9d.

Calculations may be of ſervice to thoſe who wiſh to try drilling, and have few books to direct them.

One acre is ten chains long, of 660 feet, or 220 yards long, and one yard broad, containing 4840 ſquare yards. Then if the ridge be four feet ſix inches, this makes fourteen ridges, and three feet to ſpare. This length of 220 yards, multiplied by fourteen, (the number of ridges) gives a length of 3080 yards, to which add 146 for the ſpare three feet, and it will be 3226 yards. And as two rows are drilled on a ridge, the number of rows will be in length 6452 yards; but as a deduction of 172 yards muſt be made for the head ridges, ſuppoſe three yards each, &c. the whole length to be ſown will be 6280 yards clear.

Now, a gallon [Wincheſter] holds about eighty thouſand grains. The quantity recommended to be drilled by Mr. Forbes and others, being ſix gallons, or two-thirds of a buſhel per acre, is nearly ſeventy-eight grains to a yard, or twenty-ſix to a foot. But in my experiment, by this calculation, it was only about eleven grains to a foot; which is quite ſufficient, if the ſeed be good, and it be not deſtroyed by vermin.

Now with regard to the quantity of land this drill-plough may ſow. If a horſe walks at the rate of two miles per hour, he goes ſixteen miles in eight hours, or 28,460 yards. As he ſows two ridges at once, this is ſeven lengths and two-thirds per acre, or 1686 yards to ſow an acre, being nearly ſeventeen acres in a day.

Four horſe-hoeings are calculated, equal to two ploughings. In plain ploughing they ſuppoſe the ridge is ploughed with four furrows, or eight for twice ploughing. The four horſe-hoeings are eight furrows, equal to two ploughings.

Mr. TULL directs four hoeings, and Mr. FORBES five.

Firſt. In November, when the plant has four blades.

2dly. In March, deep, and nearer the rows than the former. Both theſe hoeings ſhould be *from* the rows.

3*dly.* Hand-hoed when it begins to ſpindle, if the earth be crumbly, *to* the rows.

4*thly.* When it begins to bloſſom, *from* the rows, but as near to them as in the ſecond hoeing.

5*thly.* When done bloſſoming, to ripen and fill the grain, *to* the rows.

The laſt hoeing Mr. TULL does not directs, but Mr. FORBES adviſes it, as being of eſſential ſervice in filling the grain, and ſaving trouble in making the next ſeed-furrows. They adviſe the patent or ſowing-plough for horſe-hoeing; and the expence is calculated by Mr. CRAICK at one guinea per acre, reaping included.

But let us ſuppoſe the following, which are the prices in the county I live in.*

	£.	s.	d.
Ploughing to form the ridges	0	4	0
Harrowing	0	0	4
Four hoeings, equal to two ploughings	0	8	0
Sowing	0	0	4
Hand-hoeing twice	0	8	0
Seed, one peck and half, at 5s. a buſhel	0	1	10
Whole expence per acre	£.1	2	6

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* Near Edinburgh.

With reſpect to the rent of land, and the expence of cutting and getting in the crop, it will be no more than as if the crop were ſown broadcaſt.

I have the honour to be, Gentlemen,
Your very humble ſervant,

Bath, 1782. J. ANSTRUTHER.

P. S. You will remark, that this double drill-plough ſows two ridges at a time, the horſe going in the furrow between them, and of courſe does not tread upon the ground intended to be ſown; which with a ſingle drill muſt be the caſe, and does much harm by the horſes feet ſinking and making holes in the fine ground, which retain the water, and hurt the wheat when young.

ARTICLE LII.

To preſerve Turnips from Froſt.

[By a Gentleman Farmer.]

Mr. RACK,

IN anſwer to your enquiry, whether we have adopted any method of preſerving Turnips from the froſt; or for feeding cattle late in the ſpring; and if ſo, what thoſe methods were?—I beg leave to obſerve, that nothing of this kind is yet come into general practice in this county. With reſpect to preſerving turnips from ſuch ſevere froſts as we had this laſt winter, eſpecially when there has not been ſnow enough to cover them, I believe it would be utterly impracticable, unleſs the turnips were drawn previous to ſuch froſts.

This would on the whole never anſwer the farmer's purpoſe, as the certain trouble and expence of houſing or ſtacking them would far exceed the advantage, even in a hard ſeaſon; and, in mild winters, would be entirely loſt.

To preſerve them for late ſpring-feed is not ſo difficult an undertaking. Divers methods have been tried; and among the reſt, that of drawing and burying them in ſand; but this has not anſwered, for the following, among other reaſons:—

Turnips are a very juicy root; and although ſand be perfectly dry when thrown among them, yet, when packed together in large heaps, they naturally ſweat and communicate a moiſture, which, with the hot quality of the ſand, raiſes a ſtill greater heat; and as warmth and moiſture are two qualities which greatly promote vegetation, the vegetation of theſe roots is the firſt thing that renders them uſeleſs. They will grow till the growing quality is exhauſted, and then, by putrefying, become quite unfit for food.

The beſt method of preſerving them that I have heard of, and which has been tried with ſucceſs by ſome of our beſt farmers, is, to ſtack them up in dry ſtraw; a load of which is ſufficient to preſerve forty tons of turnips. The method is eaſy, and as follows:—

After drawing your turnips in February, cut off the tops and tap-roots, (which may be given to ſheep) and let them lie a few days in the field, as no weather will then hurt them.

Then, on a layer of ſtraw next the ground, place a layer of turnips two feet thick; and then another layer of ſtraw, and ſo on alternately, till you have brought the heap to a point. Care muſt be taken to turn up the edges of the layers of ſtraw, to prevent the turnips from rolling out; cover the top well with long ſtraw, and it will ſerve as a thatch for the whole.

In this method, as the ſtraw imbibes the moiſture exhaled from the roots, all vegetation will be prevented, and the turnips will be nearly as good in May as when firſt drawn from the field. If ſtraw be ſcarce, old haulm or ſtubble will anſwer the ſame purpoſe.

But to prevent this trouble and expence, perhaps farmers in all counties would find it moſt to their intereſt, to adopt the method uſed by our neighbours the Norfolk farmers, which is, to continue ſowing turnips to the latter end of Auguſt, by which means their late crops remain good in the field till the latter end of April, and often till the middle of May.

The advantages of having turnips good till the ſpring-feed is generally ready, are ſo obvious and ſo great, that many of our farmers (although at firſt prejudiced againſt the practice) are now come into it, and find their account in ſo doing.

I wiſh theſe few hints may prove in any degree uſeful, and am, wiſhing all poſſible ſucceſs to the Bath Society,

Your very humble ſervant,

Suffolk, W. P.
March 1ſt, 1780.

Article LIII.

To prevent the Blight in Potatoes; to make a Cow a good Milker; and to prevent the Putrefaction of Meat.

[By Mr. John Smith, of Ozleworth, in Glocesterſhire.]

INSTEAD of planting potatoes at ſpring of the year, reverſe the cuſtom, and plant them againſt winter. Plant the roots in rows a pretty good depth, and draw the earth over them with a hoe, ſo as to keep them from the froſt. At the ſpring of the year take down the ridges raiſed by the hoe, and when weeds appear, hoe the intermediate ſpace between the rows; and when the plants appear, draw up the earth round them. Many people put dung in the trenches, when the potatoes are planted in the ſpring; if the ſame method be uſed againſt winter, it will help to preſerve the roots from froſt.

It is well known that bulbous-rooted flowers never bloſſom well, if removed at the ſpring of the year. As potatoes are bulbous, the ſame inference may be drawn.

This year I have ſeen two patches, which were planted laſt year, and again this ſeaſon. In both theſe ſpots, the ſtalks that appeared from what were planted this year were curled and out of proof. The reaſon is, they do not ſet eaſy, nor are they ſo well acquainted with the ground when planted at ſpring as when planted againſt winter. I imagine the month of November is the beſt time for planting tulip-roots, and alſo potatoes.

What is called the blight in potatoes, the blight and ſmut in wheat, and the fly devouring the ſeedling turnips, are generally looked upon as a *cauſe*, yet I am clearly of opinion they are only *effects*.

I ſhall now add a few remarks on the beſt method to make a Cow a good Milker.

It is well known that the cow does not give her milk for the maſter, but for her calf. I would therefore adviſe, that for the firſt year the calf ſhould go with the mother, till they both part by conſent. Afterwards, when ſhe calves a ſecond, third, fourth time, and ſo on, let the calf be taken from the mother as ſoon as dropt, and never let them come together again.

In the uſual method of letting the calf ſuck the cow for a time, and then taking it away, the cows retains her milk in hopes of ſeeing her young one again; but in a few days her udder gets hard, and ſhe cannot part with her milk freely, were ſhe ever ſo willing. This is one great reaſon why we ſee ſo many cows with hard unſightly udders.

Nor is the loſs confined to the firſt year only; for in ſome cows the hardneſs continues during life. Neither is the loſs confined to the milk only; for when the cow is fat, it will not bring ſo much to the butcher by twenty or thirty ſhillings as if the udder were fine. This matter might in a few years be proved to any man's ſatisfaction.

Let any gentleman of fortune that likes to ſee good cattle on his farm, get good heifers and a good bull. At the uſual time let them go together, and when the calves drop, never take them from the dam till they part by conſent. Try this method for half a dozen times, and ſee if any of thoſe heifers have hard naſty udders, as the butchers term them. If, when they calve, more milk ſhould be left in their udders than the calves can take off, let that be taken away by the milker. In ſix weeks that trouble will ceaſe, as the calf by that time will take all the milk any cow can give.

Query, Whether retaining the milk is not the reaſon why cows are more ſubject to the yellows than other cattle?

If at any time a good milch cow ſhould go dry before her milk is gone, get a young calf and put it to her, in order to preſerve her milk againſt another year: for it is well known, if a cow goes one year dry, nature will loſe its power of acting for the future.

To prevent or keep meat from putrefaction till it is cold, whether ox, cow, ſheep, or pig, let them be faſted a day or two in a cool houſe. Kill them in the evening, and as ſoon as the ſkin is taken off, hang the carcaſe between two door-ways where there is a current of air. Then get a fan, ſuch as is uſed for winnowing corn, and place it to windward of the carcaſe, and let a man turn the fan the whole night.

In the morning the carcaſe will be cold and ſtiff, let the weather be ever ſo hot. A putrefaction will not immediately follow, becauſe the fluids are at reſt. Carcaſe butchers, and people that kill for the navy, would find their account in having ſlaughter-houſes near to ſome rivulet of water, where a wheel might be placed to turn a fan, and many carcaſes hung up at a time for the benefit of the wind. By this method, a conſiderable quantity of loſt meat might be annually preſerved; for in hot, ſultry weather, when no wind is ſtirring, meat will taint before it is cold.

Query, Whether this method might not be found uſeful in putrid fevers, if a fan were introduced into the ſick perſon's chamber, and turned round now and then to clear the room of ſtagnant air, and thereby give the patient a better chance, by breathing more freely in a different atmoſphere?

This thought occurred to me while I was in the farming buſineſs. A man whom I employed to turn the fan was troubled with fits. He fell down one day, and I ordered him to be ſet upon his bottom with his face to the wind, while another man turned the fan a few times round. The man, although to all appearance lifeleſs, ſoon began to rub his noſe and mouth with his hand, and immediately came to himſelf.

J. S.

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ARTICLE LIV.

On the Uſe of Chalk and Sea-Weeds.

[By a Gentleman of Kent, to the Secretary.]

IN anſwer to your enquiries about the uſe of chalk and ſea-weeds, I will endeavour to inform you all in my power.

As to chalk, almoſt half this county is a bed of it. It is uſed with great ſucceſs on various kinds of land, as clays eſpecially, and ſands; making light the former, and binding the latter. We commonly lay near one hundred cart-loads on an acre; each cart-load containing thirty-two buſhels, Wincheſter meaſure. We ſpread it ſoon after it is brought, and let it lie on the ſurface a good part of the winter, that the froſt may make it run, and incorporate the better with the ſoil.

I have lately tried chalk on a piece of ground the mereſt ſand that can well be, and found it to anſwer well by ſowing early peaſe, and turnips the ſame year as ſoon as the peaſe were off, and feeding the turnips off with ſheep. This I have done for three years together, and found each ſucceeding crop the beſt.

Sea weeds are much uſed on the eaſtern ſhore of this county. They are mixed with dung and mould, and after turning ſeveral times over, ſpread on corn land.

I find you have offered premiums for ſeveral things in which I have been converſant; to wit, hops, madder, and wood for hop-poles of various ſorts. On each of which articles I can eaſily enlarge, if required.

However, under the article of hop-poles I beg leave to mention a ſpecies of willow we have, the growth of which is very fit to be encouraged in places like Somerſetſhire; and which, in five years, will make very large poles proper for the purpoſe, as well as gates for ſheep-folds on turnips.

I am, Sir, your humble ſervant,

H. D.

[This gentleman's future correſpondence will be very acceptable, with the information he here offers.]

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ARTICLE

ARTICLE LV.

A Chart of the NORFOLK HUSBANDRY, *on a on a Farm of Twelve Fields*

Fields.	1778.	1779.	1780.	1781.	1782.	1783.
1.	Turnips, 5 Ploughings.	Barley, 3.	Clover.	Wheat, 1.	Oats, 1.	Turnips, 5.
2.	Barley, 3.	Clover.	Beans, 1.	Wheat, 1.	Turnips, 5.	Barley, 3.
3.	Clover.	Peaſe.	Wheat, 1.	Turnips, 5.	Barley, 3.	Lay.
4.	Wheat, 1.	Oats, 1.	Turnips, 5.	Barley, 3.	Lay.	Lay.
5.	Oats, 1.	Turnips, 5.	Barley, 3.	Lay.	Lay.	Lay.
6.	Turnips, 5.	Barley, 3.	Lay.	Lay.	Lay.	Wheat, 1.
7.	Barley, 3.	Lay.	Lay.	Lay.	Beans, 1.	Wheat, 1.
8.	Lay.	Lay.	Lay.	Wheat, 1.	Oats, 1.	Turnips, 5.
9.	Lay.	Lay.	Wheat, 1.	Oats, 1.	Turnips, 5.	Barley, 3.
10.	Lay.	Peaſe, 1.	Wheat, 1.	Turnips, 5.	Barley, 3.	Clover.
11.	Wheat, 1.	Oats, 1.	Turnips, 5.	Barley, 3.	Clover.	Peaſe, 1.
12.	Oats, 1.	Turnips, 5.	Barley, 3.	Clover.	Wheat, 1.	Oats, 1.

light Soil; being the beſt regular Courſe of Crops Arable for Twelve Years.

1784.	1785.	1786.	1787.	1788.	1789.
Barley, 3.	Lay.	Lay.	Lay.	Peaſe, 1.	Wheat, 1.
Lay.	Lay.	Lay.	Wheat, 1.	Oats, 1.	Turnips, 5.
Lay.	Lay.	Wheat, 1.	Beans, 1.	Turnips, 5.	Barley, 3.
Lay.	Wheat, 1.	Peaſe, 1.	Turnips, 5.	Barley, 3.	Clover.
Peaſe, 1.	Wheat, 1.	Turnips, 5.	Barley, 3.	Clover.	Wheat, 1.
Oats, 1.	Turnips, 5.	Barley, 3.	Clover.	Wheat, 1.	Oats, 1.
Turnips, 5.	Barley, 3.	Clover.	Wheat, 1.	Peaſe, 1.	Turnips, 5.
Barley, 3.	Clover.	Beans, 1.	Wheat, 1.	Turnips, 5.	Barley, 3.
Clover.	Beans, 1.	Wheat, 1.	Turnips, 5.	Barley, 3.	Lay.
Wheat, 1.	Oats, 1.	Turnips, 5.	Barley, 3.	Lay.	Lay.
Wheat, 1.	Turnips, 5.	Barley, 3.	Lay.	Lay.	Lay.
Turnips, 5.	Barley, 3.	Lay.	Lay.	Lay.	Wheat, 1.

A Chart of the NORFOLK HUSBANDRY *Courſe of Crops*

Fields.	1778.	1779.	1780.	1781.	1782.	1783.
1.	Turnips. *	Barley.	Clover. †	Wheat.	Oats.	Turnips. *
2.	Barley.	Clover.	Wheat.	Oats.	Turnips.	Barley.
	Clover.	Peaſe.	Oats.	Turnips.	Barley.	Lay.
4.	Wheat.	Oats.	Turnips.	Barley.	Lay.	Lay.
5.	Oats.	Turnips.	Barley.	Lay.	Lay.	Beans.
6.	Turnips.	Barley.	Lay.	Lay.	Beans.	Wheat.
7.	Barley.	Lay.	Lay.	Beans.	Wheat.	Turnips.
8.	Lay.	Lay.	Beans.	Wheat.	Turnips.	Barley.
9.	Lay.	Beans.	Wheat.	Turnips.	Barley.	Clover.
10.	Beans.	Wheat.	Turnips.	Barley.	Clover.	Wheat.
11.	Wheat.	Turnips.	Barley.	Clover.	Wheat.	Oats.
12.	Turnips.	Barley.	Clover.	Wheat.	Oats.	Turnips.

on a HEAVY SOIL; *being the beſt regular for Eleven Years.*

1784.	1785.	1786.	1787.	1788.	1789.
Barley.	Lay.	Lay. ‡	Beans.	Wheat.	
Lay.	Lay.	Beans.	Wheat.	Turnips.	
Lay.	Beans.	Wheat.	Turnips	Barley.	
Beans.	Wheat.	Turnips.	Barley.	Clover.	
Wheat.	Turnips.	Barley.	Clover.	Wheat.	
Turnips.	Barley.	Clover.	Wheat.	Oats.	
Barley.	Clover.	Wheat.	Oats.	Turnips.	
Clover.	Wheat.	Oats.	Turnips.	Barley.	
Wheat.	Oats.	Turnips.	Barley.	Lay.	
Oats.	Turnips.	Barley.	Lay.	Lay.	
Turnips.	Barley.	Lay.	Lay.	Beans.	
Barley.	Lay.	Lay.	Beans.	Wheat.	

EXPLANATION *of the preceding* TABLES.

In the firſt table the figures in the ſquares expreſs the number of ploughings.

The two crops after the *lays* and *clover* may be varied according to the ſeaſon, or the ſoil, by the diſcretion of the farmer. And where bullocks are fatted with ſtraw and turnips only, this plan will be more productive of profit to the farmer, and benefit to ſociety, than any other yet diſcovered; experience having ſhewn, that two hundred acres of land, half in tillage, and half natural graſs, will keep as many cattle as the whole would do all in natural graſs; by this means, therefore, all the produce of corn (labour deducted) is clear gain, and the land cannot be injured thereby.

It is to be noted, that the turnips are twice hoed, and not left nearer than fourteen or ſixteen inches to each other; that they muſt not be fed, but drawn, carted, and given to the bullocks in a ſtraw yard, or ſome other place convenient for preſerving the manure.

Beans muſt alſo be twice hoed, and in very wet ſeaſons three times, if wheat is to follow them.

Peaſe are an uncertain crop, and often fill the land with weeds.

The two capital crops, wheat and barley, in theſe tables, come twice in the courſe,—the turnips twice,—the broad clover only once; by which means the different plants are thrown at ſuch a diſtance from each other, that (ſeaſons permitting) it is impoſſible to fail of good crops; and the worm, which is produced by frequent repetitions of broad clover, and is certain deſtruction to that plant and the ſucceeding crop, is prevented.

This mark* ſignifies, that from twenty to forty cubic yards of rotten dung per acre is to be laid on immediately before the laſt ploughing.

This †—that a like quantity of compoſt, the mixture two parts ditch ſcourings, mould from borders, or almoſt any kind of earth, and the other part dung. This ſhould be heaped, and in the courſe of two years turned over three times, to mix it well, and deſtroy the weeds. Lay it on the clover in the ſpring.

And this mark ‡ denotes a covering of marle, eighty cubic yards per acre. The lay is to be fed the laſt year, ſo that it may be covered in the interval between hay and corn harveſt.

Wheat, after the clover lay, ought always to be *ſet*.

Wheat ſtubbles are never ploughed in, but raked up, and carted to the ſtraw yard.

The expence of marling (carting and ſpreading included) is reckoned, when the marle is digged in the field, at 3l. per hundred cubic yards, but I have done it for two guineas.

N. B. Six ſcore makes the hundred. Half-load carts, with three wheels, take fewer horſes than load-carts, but are worſe for the horſes.

When the turnips fail, plough the land into yard ridges, water-furrow it well, and let it lie for barley next year. This is excellent huſbandry, and greatly preferable to a wheat crop after the fallow.

The beſt method to preſerve turnips from the fly is, to take one pint of new ſeed, and ſteep it in water five or ſix hours, then mix it with another pint of new ſeed unſteeped, and a pint of ſeed of the year before; by this method the plants will come up at three different times; and as the fly always ſeizes the youngeſt plants, it ſeldom happens but that enough of each growth will be left for a crop; one pint of ſeed being ſufficient for an acre, could it be properly diſtributed. In purſuing this method, I never loſt a turnip crop.

Turnips, with chaff, and the ſtraw of barley, oats, or peaſe, are excellent food for horſes, provided the ſtraw be freſh threſhed, and given to them as they want it.

Galloway Scots, four years old, or almoſt any beaſt of that age, taken into the ſtraw-yard in October, and well attended with good ſtraw and turnips, will be fat by the April following. An acre of good turnips is ſufficient for a beaſt of forty ſtone, fourteen pounds to the ſtone. The beaſts here alluded to are ſuch as are brought to the fairs in tolerable condition.

A GENTLEMAN FARMER.

Sibton Abbey, Oct. 18, 1778.

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Remarks on the preceding Letter and Tables, in a Letter to the Secretary.

Sir,

As I was not at the meeting, I beg of you to lay what follows before the Committee. That no deception may ariſe from the foregoing tables, it is neceſſary to obſerve, that the courſe of crops contained in the firſt line of the table, was given me by the Rev. Mr. Howman, of Bracon in Norfolk, three years ſince. I formed them into a regular ſyſtem for my own uſe, which I follow as cloſely as I can. But experience hath ſhewn, that it cannot be exactly purſued. Circumſtances and ſeaſons will not permit the invariable execution of the plan. Where lands are not good enough, and not infected with the worm, which kills the red clover, the farmer contents himſelf with the firſt five crops in the table, viz. Turnips, barley, clover, peaſe, wheat; or, inſtead of the two latter,

$$\left.\begin{matrix}\text{Wheat,}\\\text{Barley,}\end{matrix}\right| \text{ or } \left\{\begin{matrix}\text{Beans,}\\\text{Wheat,}\end{matrix}\right. \left|\text{ or } \left\{\begin{matrix}\text{Wheat,}\\\text{Oats.}\end{matrix}\right.\right.$$

This plan is therefore given to the Society, not as a courſe of huſbandry, which has been invariably followed in Norfolk; but as the foundation on which the beſt huſbandry there is built.

The failure of the turnip crop or the lays, the deſtruction of peaſe or beans by inſects, or the irregularity of the weather, will, and indeed ought to occaſion ſuch variations as experience ſhall convince the intelligent farmer are moſt advantageous; but the nearer he keeps to the table, and when forced from it, the ſooner he returns to it again, the better.

Mr. Howman, who is eſteemed one of the beſt farmers in the county of Norfolk, has ſeen theſe Tables ſeveral times, and approved them.

A Gentleman Farmer.

Dec. 10, 1778.

ARTICLE LVI.

On the Origin and Progreſs of Agriculture in different Ages and Nations.

[By the Secretary to the Society.]

GENTLEMEN,

AS the advancement of Agriculture is at all times of the higheſt importance to the happineſs and proſperity of the inhabitants of this kingdom, it has very properly become the object to which your views as a Society have been principally directed.

The earth was conſidered by the antients as the Mother of Plenty. Hence, in the early ages of ſuperſtition and polytheiſm, the firſt libations in their feaſts were offered to her; and thoſe who in any manner diſtinguiſhed the arts of cultivation were numbered among their demigods, or ſecond claſs of deities. They were rewarded with the higheſt honours while living; ſtatues were erected to their memory, and ſacrifices were offered to them, when dead.

But although a conduct ſo extravagant proved that the minds of the people were groſsly enveloped in the midſt of ſuperſtition, and an almoſt total ignorance of the nature and attributes of a Supreme and Firſt Cauſe, yet it alſo forcibly indicated the high ſenſe which mankind then formed of the great advantages ariſing from the arts of cultivation.

In ages of greater refinement, and more general knowledge, the folly of a worſhip thus groſsly miſapplied became ſo evident, as to occaſion its total extermination; but the wiſeſt governments have always regarded Agriculture as an object of the firſt magnitude and importance, and by various means encouraged and promoted it.

With reſpect to ourſelves, the value of our acres is the grand ſource of national riches; and this value will ever bear an exact proportion to their cultivation and produce. And therefore, as Agriculture is the baſis of our publick wealth, and the happineſs of numberleſs individuals, I take the liberty of throwing before you a brief account of the origin and progreſs of this art in the different ages and nations.

The art of tilling, cultivating, and improving the earth, ſo as to render it fruitful, claims the precedency of all other arts in point of antiquity as

well

well as dignity. It was man's original employment in the primæval ages of happineſs and peace.

We are told by the Sacred Hiſtorian, that Adam inſtructed his children in this art both by precept and example; and that Cain applied himſelf to huſbandry, whilſt Abel led the life of a ſhepherd, feeding his flocks.

With reſpect to the methods then uſed, or the implements employed, we have no information; but when we conſider the ſlow progreſs of the mechanick arts, it is reaſonable to ſuppoſe, that at a time when the very rudiments of them could ſcarcely be known, thoſe implements muſt have been very few, and of the ſimpleſt kind.

After the deluge had deſtroyed all the works of men, and ſwept away every veſtige of human art (except the Ark) from the face of the earth, we find it was the firſt care of Noah and his deſcendants, to revive the knowledge and practice of huſbandry; and to eſtabliſh them as the firſt means of obtaining happineſs and plenty in the various countries where they ſettled.

This art was carried on with the greateſt ſimplicity in thoſe early ages; and it would be a

curious

curious ſpeculation to trace it through the ſlow and almoſt imperceptible gradations by which it has been brought to its preſent ſtate of perfection.

With reſpect to manures, we have little account (except in the Bible) of any being uſed before the eſtabliſhment of the Roman empire. In ſeveral of the Prophets[*] we find mention is made of dung and dung-hills, in a manner which indicates that their uſe in fertilizing land was not wholly unknown.

It is probable, that the inhabitants of thoſe ages which *immediately ſucceeded* the flood, knew not any method of reſtoring fertility to an exhauſted ſoil; and this opinion ſeems warranted by their frequently changing their ſituation, when the land they occupied failed in yielding its natural produce.

We find that Abraham, and the reſt of the Patriarchs, had no long-continued reſidence on one ſpot. They applied themſelves to a paſtoral life; and when their numerous flocks and herds had exhauſted the natural produce of one place, they removed to another; ennobling by their example a profeſſion or employment, which afterwards, for ſeveral ages, loſt its original dignity, by being confined to the lower claſſes of the people.

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[*] See Kings vi. 25. ix. 37. Jer. viii. 2. Pſ. lxxxiii. 10. Neh. iii. 13, 14. Ezra vi. 11. Iſa. xxv. 10. Lam. iv. 5, &c.

Such was the happineſs and tranquillity enjoyed in this innocent employment, that it gave birth to the fineſt poetical imagery, and was celebrated under the peculiar diſtinction of the *Golden Age*.

But as ſoon as the deſcendants of Abraham were ſettled in Paleſtine, they generally became huſbandmen, from the Chiefs of the tribe of Judah to the loweſt branch of the family of Benjamin. High birth or rank did not at that time make any diſtinction, for Agriculture was conſidered as the moſt honourable of all employments; witneſs the illuſtrious examples of Gideon, Saul, and David.

Many paſſages in the Sacred Writings have a ſtrong and beautiful analogy to the ſentiments of the heathen poets, in delineating the happineſs enjoyed in thoſe ages of paſtoral and agricultural employment.

The Chaldeans, who inhabited the country where agriculture had its birth, carried that valuable art to a degree of excellence unknown in former times. They cultivated their lands with great aſſiduity, and ſeem to have found out ſome means of reſtoring fertility to an exhauſted ſoil, by having plentiful harveſts in ſucceſſion; on this account they were not obliged, as their predeceſſors had been, to change their ſituations, in order to obtain a ſufficiency for themſelves and their numerous flocks and herds of cattle.

The Egyptians, who, from the natural fertility of their country by the overflowing of the Nile, raiſed every year vaſt quantities of corn, were ſo ſenſible of the bleſſings reſulting from agriculture, that they aſcribed the invention of that art to Oſiris.

They alſo regarded Iſis,* their ſecond deity, as the diſcoverer of the uſe of wheat and barley, which before grew wild in the fields, and were not applied by that people to the purpoſes of food.

Their ſuperſtitious gratitude was carried ſo far, as to worſhip thoſe animals† which were employed in tillage; and even to the produce of their lands, as leeks, onions, &c.

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* Iſis diſcovered the method of making flour from wheat and barley. DIODOR. SIC.

† "Teach the dull ox why now he breaks the clod,
"Why now a victim, and now Egypt's God."
POPE.

The divine honours paid to **Bacchus** in India were derived from the ſame ſource, he being conſidered in that country as the inventor of planting vineyards, and the other arts attendant upon agriculture.*

It is alſo related of the ancient Perſians, on the moſt reſpectable authority, that their Kings laid aſide their grandeur once every month to eat with huſbandmen. This is a ſtriking inſtance of the high eſtimation in which they held agriculture; for at that time arts were practiſed among that people in great perfection, particularly thoſe of weaving, needle-work, and embroidery.

The precepts of the religion taught by their ancient Magi, or Prieſts, included the practice of agriculture. The *Saint* among them was obliged to work out his ſalvation by purſuing all the labours of agriculture: and it was a maxim of the Zendaveſta, that he who ſows the ground with care and diligence, acquires a greater degree of religious merit, than he could have gained by the repetition of ten thouſand prayers.

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* According to **Arrian** and **Diodorus Siculus**, **Bacchus** firſt trained oxen to the plough, and taught men to cultivate the land. He alſo diſcovered many of the inſtruments and conveniences of agriculture; and for theſe ſignal benefits he became ſo much reſpected, that he was, by univerſal conſent, raiſed to the rank of a deity, and received divine worſhip and ſolemn ſacrifice.

The Phenicians, ſo well known in ſcripture by the name of *Philiſtines*, were alſo remarkable for their attention to, and ſkill in agriculture. But finding themſelves too much diſturbed and confined by the incurſions and conqueſts of the Iſraelites, they ſpread themſelves throughout the greateſt part of the Mediterranean iſlands, and carried with them their knowledge in the arts of cultivation.

MAGO, a famous General of the Carthaginians, is ſaid to have written no leſs than twenty-eight books on the ſubject; which COLUMELLA tells us were tranſlated into Latin by the expreſs order of the Roman Senate.

SERVIUS confirms this account, and adds, that when VIRGIL compoſed his celebrated Georgics, he uſed theſe books as a model.

We are informed by the ancient writers, that CERES was born in Sicily, where ſhe firſt invented the arts of tillage and of ſowing corn. For this eſſential ſervice, ſhe was, agreeable to the ſuperſtition of thoſe ages, deified, and worſhipped as the goddeſs of plenty.

The truth of this is, that in the time of Ceres, the iſland, through her endeavours and the induſtry of the people, became very fruitful in corn: And agriculture was there eſteemed ſo honourable an employment, that even their Kings did not diſdain to practiſe it with their own hands.*

But time, which at firſt gave birth to arts, often cauſed them to be forgotten when they were removed from the place of their origin. The deſcendants of Noah, who ſettled in Europe, doubtleſs carried their knowledge of agriculture with them into the regions which they ſucceſſively occupied. But thoſe who took poſſeſſion of Greece were ſuch an uncivilized race, that they fed on roots, herbs, and acorns, after the manner of beaſts.

Pelasgus had taught them the culture of the oak, and the uſe of acorns as food, for which ſervice

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* Triptolemus, in particular, who was taught by Ceres the art of ſowing corn.

vice we are told divine honours were paid him by the people.

The Athenians, who were the firſt people that acquired any tincture of politeneſs, taught the uſe of corn to the reſt of the Greeks. They alſo inſtructed them how to cultivate the ground, and to prepare it for the reception of the ſeed. This art, we are told, was taught them by TRIPTOLEMUS. The Greeks ſoon perceived that bread was more wholeſome, and its taſte more delicate, than that of acorns and the wild roots of the fields; accordingly they thanked the Gods for ſuch an unexpected and beneficial preſent, and honoured their benefactor.

As the arts of cultivation increaſed, and the bleſſings they afforded became generally experienced, the people ſoon preferred them to whatever the ravages of conqueſt, and the cruel depredations of ſavage life, could procure. And accordingly we find that the Athenian Kings, thinking it more glorious to govern a ſmall ſtate wiſely, than to aggrandize themſelves, and enlarge the extent of their dominions by foreign conqueſts, withdrew their ſubjects from war, and moſtly employed them in cultivating the earth. Thus, by continued application, they brought agriculture to a conſiderable degree of perfection, and ſoon reduced it to an art.

HESIOD, who is generally thought to have been contemporary with HOMER, was the firſt we know of among the Greeks who wrote on this intereſting ſubject. According to the cuſtom of the Oriental Authors, he wrote in poetry, and embelliſhed his poem with luxuriant deſcription and ſublime imagery. He calls his poem "*Weeks and* "*Days*," becauſe Agriculture requires exact obſervations of times and ſeaſons.

XENOPHON has alſo, is his Œconomics, remarked, that Agriculture is the nurſing mother of the arts. For, ſays he, "where Agriculture "ſucceeds proſperouſly, there the Arts thrive; "but where the earth neceſſarily lies uncultivated, there the other arts are deſtroyed."

The other eminent Greek writers upon Agriculture were, DEMOCRITUS of Abdera, SOCRATICUS, ARCHYTAS, TARENTINUS, ARISTOTLE, and THEOPHRASTUS, from whom the art received conſiderable improvements; as it did alſo from HIERON, EPICHARMUS, PHILOMETOR, and ATALUS.*

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* Agricult. Dictionary.

The old Romans eſteemed Agriculture ſo honourable an employment, that in the earlieſt times of the Republick, when patriotiſm was more than an empty name, the higheſt praiſe that could be given a man was to ſay of him, that he had well cultivated his ſpot of ground.

A judicious and learned writer† has of late very juſtly remarked, that "One of the moſt immediate effects of an agricultural life is, that it "imparts a ſettled diſpoſition, and a great degree "of local attachment. The very method alſo, "of procuring ſubſiſtence from the earth, renders "the ſpot which is the ſubject of cultivation "familiar; and a kind of natural gratitude for "the increaſe tends to endear it to the mind." And that "it appears to have been a favourite "piece of policy with the Romans, founded on "the beſt principles, to inſtil a notion of local "attachment as early as poſſible after the commencement of the ſtate."

The moſt illuſtrious ſenators of the empire, in the intervals of publick concerns, applied themſelves to this profeſſion; and ſuch was the ſimplicity of thoſe ages, that they aſſumed no appearance of magnificence and ſplendour, or of majeſty, but when they appeared in publick. At their return from the toils of war, the taking of cities, and the ſubduing of hoſtile nations, their greateſt Generals were impatient till they were again employed in the arts of cultivation.† They thought it no diſgrace to follow the plough, although they were at the ſame time prepared to ſerve the wants of the Republick in every department of the government, to attend her councils, or to put themſelves at the head of her victorious legions.

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† Dr. Falconer, in his Remarks on the Influence of Climate, Situation, Way of Life, &c. on the Temper and Manners of Mankind. Page 353.

It muſt indeed be allowed, that when the Romans became enervated by the fatal introduction of Aſiatick luxury, they gradually loſt the noble ſimplicity of their anceſtors, and employed their ſlaves only in the ſeverer labours of a country life. But though they did not *themſelves* hold the plough, yet even men of conſular dignity looked upon it as a reward for their publick ſervices, when they obtained leave to retire into the country; and were equally reſpected when overlooking their farms, as when ſeated in the chair of magiſterial authority.

† For inſtance, REGULUS, CINCINNATUS, and divers others.

Regulus, a celebrated Roman commander, when in Africa, requeſted of the Senate to be diſmiſſed, leſt his *farm* might ſuffer for want of proper cultivation in his abſence; and the Senate wrote him for anſwer, that it ſhould be taken care of at the publick expence, while he continued to lead their armies.

The antients appear to have entertained an uniform ſenſe of the influence an agricultural life had on the manners and morals of the people.

Alexander built cities for the Indian nations, that they might employ themſelves in huſbandry, and becoming thereby poſſeſſed of property, which naturally ſuggeſted a care for its preſervation, they might on that account be more cautious of offering injury or violence to others.*

Cicero expreſſed an high opinion of the good effects of an agricultural life on the manners and conduct, in his work, *de Senectute, & pro L. Roſcio Amerino.*

And Strabo tells us, that thoſe who practiſed Agriculture in India, were the moſt moral and juſt of any ranks of the people.

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* Hiſtory of India.

Cato the Cenſor, that illuſtrious Roman general, politician and lawyer, after having governed extenſive provinces, and ſubdued many warlike nations, did not think it below his dignity to write a Treatiſe on Agriculture. This work (as we are told by Servius) he dedicated to his own ſon; it being the firſt Latin treatiſe written on this important ſubject. This book has been handed down to us in all its purity, in the manner that Cato wrote it.

Varro compoſed a treatiſe on the ſame ſubject, and on a more regular plan. This work is embelliſhed will all the Greek and Latin erudition of that learned author, who died 28 years before the commencement of the Chriſtian æra

Virgil, who lived about the ſame time, has adorned this ſubject with the language of the Muſes, and given it inexpreſſible grace, beauty, majeſty, and dignity, by his verſe. In his Georgicks, he has finely embelliſhed he precepts and rules of Huſbandry left by Hesiod, Varro, and Mago.

Columella, who flouriſhed in the reign of the Emperor Claudius, wrote twelve books on huſbandry, replete with important inſtruction.—

He was a native of Bœotia in Spain, and had devoted the principal part of his time to the ſtudy of Agriculture.

This art received likewiſe great improvement from the two Saffernæ, Scorpa, Tremellius, and Tirentius.

Palladius alſo wrote ſeveral treatiſes on the ſame ſubject.

From this period to that of the reign of Constantine Poganatus, huſbandry continued in a declining ſtate; but that wiſe Emperor cauſed a large collection of the moſt uſeful precepts relating to Agriculture to be extracted from the beſt writers, and publiſhed them under the title of Geoponics. It has been aſſerted, that he made this collection with his own hand; and the truth of the aſſertion is not improbable, as it is well known, that after he had conquered the Saracens and the Arabians, he not only practiſed and encouraged, but ſtudied the arts of peace, fixing his principal attention on Agriculture, as their beſt foundation.

But after the death of Constantine, the increaſing attention of the people to commerce, and the ignorance and groſs ſuperſtition of the ages which ſucceeded, ſeems to have rendered Agriculture an almoſt neglected ſcience. We find no veſtiges of any thing tolerably written on the ſubject. No new attempts were made to revive it, or to improve it, till the year 1478, when Crescenzio publiſhed an excellent performance on the ſubject at Florence. This rouſed the ſlumbering attention of his countrymen, ſeveral of whom ſoon followed his example. Among theſe, Tatti, Steffano Augustina Gallo, Sansovino, Lauro, and Tarello, deſerve particular notice.

But to return to our own country.

We are very much in the dark with reſpect to the ſtate and progreſs of Agriculture in Great-Britain previous to the fourteenth century. That it was pretty generally practiſed, eſpecially in the eaſtern, ſouth, and midland parts of England, is certain; but of the mode, and the ſucceſs, we are left almoſt totally ignorant. In the latter end of the fifteenth century, however, it ſeems to have been cultivated as a ſcience, and received very great improvement.

At this time our countryman Fitzherbert, Judge of the Common-Pleas, ſhone forth with diſtinguiſhed eminence in the practical parts of huſbandry. He appears to have been the firſt Engliſhman who ſtudied the nature of ſoils, and the laws of vegetation, with philoſophical attention. On theſe he formed a theory confirmed by experiments, and rendered the ſtudy pleaſing as well as profitable, by realizing the principles of the antients, to the honour and advantage of his country. Accordingly, he publiſhed two treatiſes on this ſubject; the firſt, entitled "*The Book* "*of Huſbandry*," appeared in 1534; and the ſecond, called "*The Book of Surveying and Improvements*," in 1539.

Theſe books, being written at a time when philoſophy and ſcience were but juſt emerging from that gloom in which they had long been buried, were doubtleſs replete with many errors; but they contained the rudiments of true knowledge, and revived the ſtudy and love of an art, the advantages of which were obvious to men of the leaſt reflection. We therefore find that FITZHERBERT'S books on Agriculture ſoon raiſed a ſpirit of emulation in his countrymen, and many treatiſes of the ſame kind ſucceſſively appeared, which time has however deprived us of, or at leaſt they are become ſo very ſcarce as only to be found in the libraries of the curious.

About the year 1600, France made ſome conſiderable efforts to revive the arts of huſbandry, as appears from ſeveral large works, particularly, *Les Moyens de devenir Riche*; and the *Coſmopolite*, by Bernard de Palissy, a poor porter, who ſeems to have been placed by fortune in a ſtation for which nature never intended him; *Le Theatre d'Agriculture*, by Deserres; and *L'Agriculture et Maiſon Ruſtique*, by Meſſrs. Etienne, Liebault, &c.

Nearly in the ſame period, the *practice* of huſbandry became more prevalent among this people and the Flemings than the publiſhing of *books* on the ſubject. Their intention ſeemed to be that of carrying on a private lucrative employment, without inſtructing their neighbours. Whoever therefore became deſirous of copying their method of Agriculture, was obliged to viſit that country, and make his own remarks on their practice.

The principal idea they had of huſbandry was, by keeping the lands clean and in fine tilth, to make a farm reſemble a garden as nearly as poſſible.

Such an excellent principle, at firſt ſetting out, led them of courſe to undertake the culture of *ſmall farms* only, which they kept free from weeds, continually turning the ground, and manuring it plentifully and judiciouſly. When they had by this method brought the ſoil to a proper degree of cleanlineſs, health, and ſweetneſs, they chiefly cultivated the more delicate graſſes, as the ſureſt means of obtaining a certain profit upon a ſmall eſtate, without the expence of keeping many draught horſes and ſervants. A few years experience was ſufficient to convince them, that ten acres of the beſt vegetables for feeding cattle, properly cultivated, would maintain a larger ſtock of grazing animals, than forty acres of common farm graſs on land badly cultivated. They alſo found, that the beſt vegetables for this purpoſe were lucerne, ſainfoin, trefoil of moſt kinds, ſweet fenugreek, buck and cow-wheat, field turnips, and ſpurrey.*

The grand political ſecret of their huſbandry, therefore, conſiſted in letting farms on improvement. They are ſaid alſo to have diſcovered nine ſorts of manure, but what they all were, we are not particularly informed. We find however, that marle was one of them, the uſe and virtues of which appear alſo to have been well known in this kingdom two hundred years ago,† although

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* Agricult. Dictionary.

† See Fitzherbert and Tusser.

it was afterwards much neglected. They were the firſt people among the moderns, who ploughed in green crops for the ſake of fertilizing the ſoil; and who confined their ſheep at night in large ſheds built on purpoſe, the floors of which were covered with ſand or virgin earth, &c. which the ſhepherd carted away each morning to the compoſt dunghill.

Let us now return to England. During the reign of Charles the Firſt, our fatal domeſtick diſſentions and wars reverſed the true order of things, changing our ploughs and pruning-hooks into martial weapons. But in the general revolution of affairs, which took place on the death of that unfortunate Monarch, artful and avaricious men crept into the confiſcated eſtates of ſuch of the nobility and gentry as had ſteadily adhered to the royal cauſe; and as many of theſe *new* incroachers *had riſen* from the plough, they returned with pleaſure to their old occupations, being chiefly animated with the love of gain. About this time, TUSSER, PLATT, PLATTES, HARTLIB, BLYTHE, and ſome others, ſeized this favourable opportunity of encouraging the diſpoſition of the common people, by writings, which have been equalled by few in later times.

This revival of the art of huſbandry received very conſiderable encouragement from Cromwell himſelf.

Sir Hugh Platt was one of the moſt ingenious huſbandmen of the age in which he lived; yet ſo great was his modeſty, that all his works, except his Paradiſe of Flora, ſeem to be poſthumous. He held a correſpondence with moſt of the lovers and patrons of agriculture and gardening in England; and ſuch was the juſtice and modeſty of his temper, that he always named the author of every diſcovery communicated to him. Perhaps no man in any age diſcovered, or at leaſt brought into uſe, ſo many new kinds of manure. This will be evident to thoſe who read his account of the compoſt and covered dung-hills, and his judicious obſervations on the fertilizing qualities lodged in ſalt, ſtreet-dirt, and the *ſullage* of ſtreets in great cities, clay, fuller's-earth, mooriſh earths, dung-hills made in layers, fern, hair, calcination of all vegetables, malt-duſt, willow-tree earth, ſoaper's aſhes, urine, marle, and broken pilchards.

Gabriel Plattes may be ſaid to have been an original genius in huſbandry. He began his obſervations at an early period in the reign of

Queen **Elizabeth**, and continued them down to the Commonwealth. But notwithſtanding the great merit of this writer, and the eſſential ſervice he had rendered his country by his writings, the public ungratefully ſuffered him to ſtarve and periſh in the ſtreets of London, nor had he a ſhirt on his back when he died.

Samuel Hartlib, a celebrated writer on agriculture in the laſt century, was highly eſteemed and beloved by **Milton**, and other great men of his time. In the preface to the work entitled *his Legacy*,[*] he laments that no publick director of huſbandry was eſtabliſhed in England by authority; and that we had not adopted the Flemiſh method of letting farms upon improvement.

This remark of **Hartlib's** procured him a penſion of 100l. a year from **Cromwell**; and the writer afterwards, the better to fulfil the intention of his benefactor, procured Dr. **Beatti's** excellent annotation on the Legacy, with other valuable papers from his numerous correſpondents.

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[*] It muſt be here obſerved, that the famous work attributed to **Hartlib**, and called *his Legacy*, was not written by him. It was only drawn up at his requeſt by one R. **Childs**, and after undergoing **Hartlib's** correction and reviſal, was publiſhed by him. It conſiſts of a general anſwer to this queſtion; "What are the actual defects and omiſſions, and what the poſſible improvements, in Engliſh huſbandry."

The time in which Hartlib flouriſhed ſeems to have been an æra when the Engliſh huſbandry roſe to great perfection, compared with that of former ages; for the preceding wars had impoveriſhed the country gentlemen, and of courſe made them induſtrious. They found the cultivation of their own lands to be the moſt profitable ſtation they could fill: but this wiſe turn was not of long continuance. At the Reſtoration, they generally became infected with that intoxication and love of pleaſure which ſucceeded. All their induſtry and knowledge were exchanged for neglect and diſſipation; and huſbandry deſcended almoſt entirely into the hands of common farmers.

In that age of unreſtrained indulgence, when vice and folly were purſued to the excluſion of almoſt every thing ſerious and truly intereſting; Evelyn was the firſt writer who inſpired his countrymen with a deſire of reviving the ſtudy of agriculture. He was followed by the famous Jethro Tull. And their joint labours opened a new and extenſive ſphere for the minds of mankind to range in.

Evelyn, by his admirable Treatiſes on earth and on planting, and Tull, by ſhewing the ſuperior advantages of the drill-huſbandry, excited numbers to bring their theory to the teſt of fair experiment; and the ſucceſs that attended it, proved the rectitude of their general principles, and the ſolidity of their reaſoning.

Many valuable and capital improvements have ſince that period been made in Engliſh huſbandry; and theſe great men have been ſucceeded by a variety of writers, many of whom have done eſſential ſervice, by enlightening the minds of their countrymen, and exciting them to emulation.

About the middle of the laſt century, Ireland began to make a conſiderable figure in the art of huſbandry. It muſt, indeed, be confeſſed, that the Iriſh had very ſtrong prejudices in favour of a wretched method of agriculture, till BLYTHE opened their eyes by his excellent writings. Since that time, a ſpirit of improvement has more or leſs been promoted, and in many inſtances carried on with great zeal, by the nobility, clergy, and gentry of that kingdom.

In proof of this, it will be ſufficient to obſerve, that the tranſactions of the Dublin Society for encouraging huſbandry are now cited by all foreigners, in their memoirs relating to that ſubject.

And the obſervations of that diſcerning and judicious writer, Arthur Young, eſq; in his late Tour through that kingdom, ſhew, that, in many reſpects, improvements there have of late years made a progreſs nearly as rapid as in England.

After the peace of Aix-la-Chapelle, moſt of the nations of Europe, by a ſort of tacit conſent, applied themſelves to the ſtudy of agriculture, and continued to do ſo, more or leſs, amidſt the univerſal confuſion that ſucceeded.

The French found by repeated experience, that they could never maintain a long war, or procure a tolerable peace, unleſs they could raiſe corn enough to ſupport themſelves in ſuch a manner as not to be obliged to harſh terms on the one hand, or to periſh by famine on the other. This occaſioned the King to give publick encouragement to agriculture, and even to be preſent at the making of ſeveral experiments. The great, and the rich, of various ranks and ſtations, followed his example; and even the ladies were candidates for a ſhare of fame in this publick-ſpirited and commendable undertaking.

During the hurry and diſtreſſes of France in the war of 1756, conſiderable attention was paid to agriculture. They felt the effects, and ſaw the neceſſity of promoting it. Prize queſtions were annually propoſed in their rural academies, particularly thoſe of Lyons and Bourdeaux; and many judicious alterations were made by the Society for improving agriculture in Britanny.

Since the concluſion of that war in 1760, matters have been carried on there with great vigour. The Univerſity of Amiens made various propoſals for the advancement of huſbandry; and the MARQUIS DE TOURBILLY (a writer who proceeded chiefly on experience) had the principal direction of a Georgical Society eſtabliſhed at Tours.

The Society at Rouen alſo deſerves notice; nor have the King of France and his Miniſters thought it unworthy their attention. There are at preſent about fifteen Societies exiſting in France, eſtabliſhed by royal approbation, for the promoting of agriculture; and theſe have twenty co-operating Societies belonging to them.

About this time vigorous exertions began to be made in Ruſſia to introduce the moſt approved ſyſtem of Huſbandry which had taken place in other parts of Europe. The preſent illuſtrious Empreſs of that vaſt and riſing empire has ſent ſeveral Gentlemen* into England and other nations, to ſtudy agriculture, and is giving it all poſſible encouragement in her own dominions.

The art of agriculture has alſo been for near thirty years publickly taught in the Swediſh, Daniſh, and German Univerſities, where the Profeſſors may render effectual ſervice to their reſpective countries, if they underſtand the practical, as well as the ſpeculative part, and can converſe with as much advantage with the farmer as with VIRGIL and COLUMELLA.

Even Italy (ſunk as it is in luxury and the enervating arts of pleaſure) has not been totally inactive. The Neapolitans of this age have condeſcended to recur to the firſt rudiments of revived huſbandry, and begun to ſtudy anew the Agricultural Syſtem of CRESCENZIO, firſt publiſhed in 1478.

The people of Bergamo have purſued the ſame plan, and given a new edition of the Ricordo d' Agriculture de Tarello, firſt publiſhed in 1577.

The Dutchy of Tuſcany have, to their honour, imbibed the ſame ſpirit for improvement. A private Gentleman, above forty years ſince, left his whole fortune to endow an Academy of Agriculture. The firſt Eccleſiaſtick in the Dutchy is preſident of this ſociety, and many of the chief nobility are members.

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* M. JOHN KOMOVE, of Peterſburgh, one of theſe Gentlemen, is an honorary Member of the Bath Society.

Animated with a deſire that the people under his government ſhould excel in the art of huſbandry, his Sardinian Majeſty has alſo ſent perſons to learn the different modes of practice in foreign countries; and made ſome ſpirited attempts to eſtabliſh a better method of agriculture among his ſubjects.

In Poland, where a natural fertility of ſoil ſeems to diſpenſe with the neceſſity of calling in the aid of improvements, M. De Bieluski, grand Marſhal of the Crown, has made many ſucceſsful attempts to introduce the new huſbandry among his countrymen; and procured the beſt inſtruments for that purpoſe from France, England, and other parts of Europe.

The Hollanders are the only people now in Europe who ſeem to look upon agriculture with indifference. Except the ſingle collateral inſtance of draining their fens and moraſſes, they have ſcarcely paid any attention to it; and even this ſeems to have proceeded more from the motive of ſelf-preſervation than any love of, or diſpoſition to huſbandry.

In the year 1759, a few ingenious and publick-ſpirited men at Berne in Switzerland eſtabliſhed a Society for the advancement of agriculture and rural œconomics. In that ſociety were many men of great weight in the republic, and moſt of them perſons of a true caſt for making improvements in huſbandry, being enabled to join the practice with the theory.

Nor muſt we here omit to mention, that the juſtly celebrated Linnæus and his diſciples have performed great things in the North of Europe, particularly in diſcovering new kinds of profitable and well-taſted food for cattle.

About the ſame time, Sweden largely augmented a commerce that had long been confined within narrow bounds; and with a ſpirit worthy of general imitation, beſtowed ſucceſsful labours on a ſoil which had before been looked upon as cold, barren, and incapable of melioration. Of this the Stockholm Memoirs will be a laſting monument.

Denmark, and many of the courts in Germany, followed the ſame example: Woollen manufactures were encouraged, and his Daniſh Majeſty ſent three perſons into Arabia Felix to make remarks, and bring over ſuch plants and trees as would be uſeful in huſbandry, building, and rural affairs.

The Dutchy of Wirtemburgh alſo, a country by no means unfertile, but even friendly to corn and paſturage, has contributed its aſſiſtance towards the improvement of agriculture, having more than thirty years ſince publiſhed fourteen œconomical relations at Sturgard.

Nor muſt we forget the very aſſiduous attention of the learned in Leipſic and Hanover to this great art of ſupporting and rendering mankind happy, wealthy, and powerful. During the rage and devaſtation of a long war, they cultivated the arts of peace; witneſs the *Journal d' Agriculture* printed at Leipſic, and the *Recueils d' Hanover* printed in that city.

Even Spain, conſtitutionally and habitually inactive on ſuch occaſions, in ſpite of all their natural indolence, and the prejudices of bigotry, invited LINNÆUS, with the offer of a large penſion, to ſuperintend a college founded for the purpoſe of making new enquiries into the Hiſtory of Nature, and the Art of Agriculture.

But, without any improper partiality to our own country, we are fully juſtified in aſſerting that England alone exceeds all modern nations in Huſbandry.* To the natural genius of the people have been added the theory and practice of all nations in ancient and modern times. This accumulated maſs of knowledge has been arranged, divided, and ſubdivided; and after paſſing the teſt of practical experiments, the eſſential and moſt valuable parts of it have been preſerved and amply diffuſed in the works of a few excellent writers on the ſubject. And from the ſpirit which for the laſt twenty years has animated many of our nobility and gentry, to become the liberal patrons of improvement, there is reaſon to hope that this moſt uſeful of arts will, in a few years, be carried to a greater pitch of perfection than it has ever yet attained in any age or country.

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* Mr. YOUNG, in comparing the Linen Manufacture in Ireland with the manufactures of this kingdom, makes the following obſervations:—"The manufacture of the ſingle city of Norwich (ſays
" he) amounts to near as much as the whole linen export of Ire-
" land, yet very far is that from being the whole exported produce
" of a province! It is not that of a ſingle county; for Norfolk,
" beſides feeding that city, Yarmouth, and Lynn, two of the
" greateſt ports in England, and a variety of other towns, exports,
" I believe, more corn than any other county in the kingdom;
" and whoever is acquainted with the ſupply of the London mar-
" kets knows, that there are thouſands of black cattle fattened
" every year on Norfolk turnips, and ſent to Smithfield. What a
" ſpectacle is this! The agriculture in the world the moſt pro-
" ductive of wealth by exportation, around one of the greateſt ma-
" nufactures in Europe."

TOUR *through* IRELAND, part 2, p. 119.

The very reſpectable Societies which have been eſtabliſhed on the moſt liberal plans in London, Norfolk, and divers other parts of this nation, have made ſpirited exertions for the advancement of agriculture. They have already done much, and there is reaſon to expect, that the opportunity and aſſiſtance which the reſtoration of peace affords, will enable them to do much more of what remains to be accompliſhed.

And here it is not eaſy to reſiſt the impulſe I feel of expreſſing a wiſh that the ſeveral Provincial Societies in this kingdom were, like thoſe of ſome *other* countries, diſtinguiſhed and encouraged by *a portion of Royal munificence.*[*] This would reflect additional luſtre even on Majeſty, and animate individuals liberally to ſupport theſe inſtitutions, which reflect the higheſt honour on a ſtate, and tend to promote the intereſt and happineſs of every claſs of its inhabitants.

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[*] The Society particularly recommend *this hint* to ſuch of their readers as are Members of the Legiſlature; as ſome publick encouragement of this kind to *Provincial Societies* would be conſiſtent with the wiſeſt policy, and is greatly to be wiſhed by every lover of his country. This, if once obtained, would influence numbers to join ſuch Societies, and thereby render their finances equal to more liberal exertions for the accompliſhment of a ſyſtem of general improvement in agriculture.

But it is not to the exertions of publick ſocieties, excellent and honourable as they are, that *all* our modern improvements in agriculture owe their origin. A conſiderable number of valuable books have within the laſt thirty years been publiſhed on the ſubject; in conſequence of which the knowledge of improvements made in this and other nations have been amply ſpread, which might otherwiſe have remained confined to a ſingle county, or even a ſtill ſmaller diſtrict. Among theſe, the works of Lord KAIMES, Mr. YOUNG, STILLINGFLEET, Dr. HUNTER, ELLIS, RANDAL, LISLE, CLARKE, MARSHAL, MORTIMER, BAKER, VARLEY, HARTE, DUHAMEL, BRADLEY, KENT, DE TURBILLY, MILLS, and others, have greatly tended to enlighten the underſtandings of ſuch as read them, and to remove the deeply-rooted prejudices in favour of ancient modes of practice, which farmers in general are too apt to entertain.*

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* The Muſeum Ruſticum, the Farmer's Dictionary, and the Farmer's Magazine, may not perhaps be improperly mentioned;—each containing detached pieces of acknowledged merit.

In mentioning theſe, your own Publication of Select Papers muſt not be forgotten; a publication which, if continued on the ſame judicious plan with what has already appeared, will tend in an eminent degree to accompliſh that purpoſe which gave exiſtence to your diſintereſted and laudable inſtitution.

Every individual who wiſhes the proſperity and happineſs of this country, reveres your ſpirited exertions to promote theſe valuable purpoſes. And I flatter myſelf the intelligent and liberal-minded, who are not at preſent its patrons, will be induced, from the ſame motives of publick ſpirit, to give it the ſanction of their approbation, not only in praiſes which coſt nothing, but in contributing to its ſupport and enlargement.

I am conſcious that the imperfect ſketch here given of the progreſs, ſucceſſive improvements, and preſent ſtate of agriculture, is by no means ſo worthy of your attention as I could wiſh, or as it ought to have been. But as it may poſſibly excite ſome abler pen to reſume the ſubject, I ſubmit it entirely to your diſpoſal; and have the honour to ſubſcribe myſelf,

Gentlemen, your's moſt reſpectfully,

EDMUND RACK.

Bath, May 20, 1783.

ARTICLE LVII.

On Planting barren Lands with Wood.

[By a Correſpondent Member.]

GENTLEMEN,

AMONG all the improvements which a lover of his country would naturally wiſh to ſee take place, there are none which ſeems to want, or to merit encouragement, more than that of planting barren ſoils and waſte lands with wood. One principal cauſe of this improvement having made a ſlower progreſs than many others is, that the firſt expence is conſiderable, and the profits, although certain in the end, are remote; and therefore I have for ſeveral years wiſhed to ſee your premiums increaſed on this article.

As I have made conſiderable plantations in my time, and always found the future profits, as well as the preſent pleaſure attending it, to exceed my expectations, I do not offer my advice on an uncertain theory, but *know* what I take the liberty of recommending to you.

There are three kinds of land uſually termed barren; and with reſpect to almoſt every purpoſe but that of planting, they are, and muſt remain ſo, unleſs an expence, greater than moſt people chuſe to be at, be ſubmitted to in improving them.

The firſt kind is mere ſand. This ſoil, unleſs there be clay or marle at a few feet depth under it, (as is the caſe in the Weſt part of Norfolk, about Thetford and Brandon) will pay better by being planted with Scotch Firs and Larches than any thing elſe; eſpecially, if, in making the plantations, a little clay or marle be mixed with the ſand in the holes where each tree is planted; and this may be done at a ſmall expence.

Theſe trees will grow here very well. I know ſeveral large plantations, where the ſoil has been ſo perfectly ſandy, that there was not graſs enough to keep one ſheep on an acre, and yet after being planted twenty years, there have been two thouſand trees on an acre, worth at the loweſt eſtimate one ſhilling each as they ſtood. A few acres of ſuch land thus planted would be a pretty fortune for the younger branch of a family.

The ſecond kind is boggy or wet moors, which are ſometimes ſo ſituated as not to be drained without too great an expence. Wherever this is the caſe, ſuch ſoils may be planted to great advantage,

vantage, as Mr. Fletcher in his letter on this ſubject, printed in your firſt volume, has juſtly remarked. Aſh for poles or copſing will thrive here beyond expectation; and alders, with ſeveral ſpecies of the ſallow tribe, will grow rapidly, and in twenty years after planting pay a profit of three pounds per acre per annum, for the whole time. The expence attending it is confined almoſt wholly to the firſt five or ſix years; for after that time little more is required than to keep up the fences, and the profit is certain.

The third ſoil on which planting anſwers better than any thing elſe, is barren rocky hills, which cannot be ploughed on account of the ſtones lying level with the ſurface, or growing above it. In ſuch places there are numerous little clefts or fiſſures in the rocks, filled with veins of earth to a conſiderable depth, which the roots of trees will follow and find ſufficient nouriſhment in. Many inſtances of this may be found in the counties of Somerſet, Glouceſter, and Dorſet, where the wiſdom of our forefathers induced them to try the experiment. On the north ſlope of Mendip hills in particular, (a ſituation as unfavourable as moſt, on account of its being a bed of rocks expoſed to the bleak north and eaſt winds) we ſee beautiful woods of large extent hanging over the pariſhes of Compton-Martin, Ubley, Blagdon, Hutton, and Churchill. In theſe woods, although the timber is not large, the growth of the pollard trees and copſe wood muſt every twelve years bring in conſiderable ſums to the owners, although the land for any other purpoſe would not be worth one ſhilling an acre.

In planting barren mountainous ſituations, full of ſtone, no particular directions can be given as to the number of trees per acre, for you muſt follow the veins of earth where they are deepeſt; but in general plant as thick as you can, for this will beſt prevent the bad effects of tempeſtuous winds, by the interior parts being ſheltered from them.

In theſe ſituations intermix Scotch Firs, which will ſecure leſs hardy trees from the fury of the winds, eſpecially if a double row of them form the boundary. As the ſurfaces of ſuch places are moſtly craggy and uneven, be careful to plant your trees in the little hollows, for two reaſons; *firſt*, becauſe there is moſt earth and moiſture; and *ſecondly*, becauſe in theſe cavities the plants will, while young, be moſt ſheltered from the winds. Fear not to plant too thick, for as the plants increaſe in ſize and hardineſs, you may thin them at pleaſure, and the wood will pay for the labour.

Your young plants ſhould be raiſed in a ſituation as ſimilar as poſſible to that where you intend they ſhould continue; for if they are tranſplanted out of a rich warm nurſery, it would prove their deſtruction. As there is ſeldom ſufficient depth of ſoil among the rocks to receive long tap-roots, the plants which naturally have them ſhould be cut off when they are firſt taken from the ſeed-beds, and planted in the nurſery. By treating them in this manner, although their vigour will be checked for the firſt year or two, until they have ſent forth a number of lateral roots, they will recover their ſtrength, and prove equally thrifty with others.

Theſe plantations may be made with beech, birch, oak, aſh, ſycamore, and black poplar always obſerving to place the tendereſt trees in the leaſt expoſed ſituations, where they are ſheltered from north and eaſt winds. In places where the ſoil is very thin, raiſe little hillocks about the young plants, which will greatly encourage their growth.

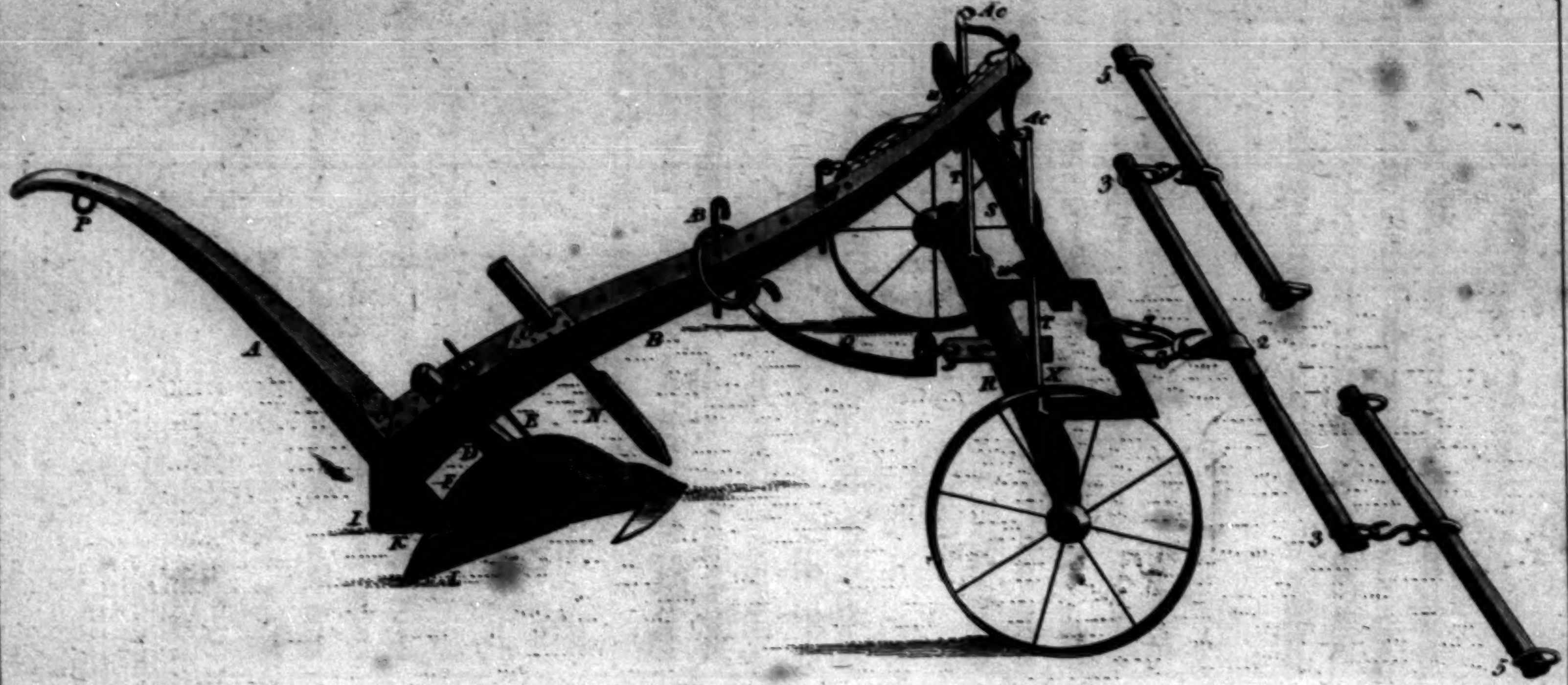
In ſuch bleak ſituations, plant as late in the ſpring as you can with ſafety. April is a month in which it may be expected the moſt ſtormy weather is over, and all the kinds of trees I have mentioned may ſafely be replanted at that time. But your nurſery ſhould always be near the ſpot you intend to plant, or elſe the roots of your young trees will get dry, and their buds be rubbed off in carriage.

During the firſt three months after planting, they ſhould frequently be examined, and the earth made faſt about their roots, otherwiſe they will be looſened by the winds; but after that time they will have put forth new roots ſufficient to hold them ſecurely.

The upright Engliſh elm, and the wich elm, may alſo be properly introduced in theſe ſituations, for they are hardy trees, and, when once rooted, grow well on rocky ſoils. The timber of the latter is very valuable for naves of carriage wheels, and boring for water-pipes.

If oaks, cheſnuts, or beech, or indeed any other tree that ſheds its leaves in winter, grow crooked, make inciſions with the point of a knife from top to bottom in the hollow part. This will occaſion the tree to increaſe in bulk more in thoſe parts than in any other; and by this ſimple eaſy method, I have known many a crooked tree grow ſtrait and handſome.

to Front Page 357. Vol. II.



J. Lodge sculp.

Mr. Bolwell's Norfolk-Plough.

I ſhall be happy if theſe few obſervations may in any degree prove uſeful, or tend to encourage planting in your counties.

I am, your's, &c.

Somerſet. R. F.

ARTICLE LVIII.

Deſcription of the Model of a Norfolk Plough ſent to the Society by Mr. BOSWELL.

[Illuſtrated with an accurate Engraving.]

SIR, Piddletown, Dec. 4, 1779.

THE model of the Norfolk Plough, which I now ſend agreeable to the requeſt of the Society, is complete on a ſcale of three inches to a foot. As an explanation of its various parts may be neceſſary, I flatter myſelf the following obſervations will not be deemed impertinent.

EXPLANATION.

A the tail. B the beam. C the head.

D the wood ſpindle. E the iron ſpindle.

F the wood mould-board fitted to the iron plat or turn-furrow.

G the iron turn-furrow: This part is generally caſt to its proper ſhape.

H the ſhare, with a ſocket to fit on the head, by which means it is eaſily taken off to be repaired.

I the ſide iron. K the heel iron. L the ground-raiſe. Theſe three are often made of caſt-iron.

M a pin to keep the mould-board at a proper diſtance.

N the coulter.

O O O O O O O O eight iron pieces to ſtrengthen the joints, and thoſe parts where the greateſt power or friction is applied. P a ſtaple in the tail, through which the plough-line paſſes. Q the beam-ring and breaſt-iron.

R the breaſt. S the pillar. T the ſtandards.

V W pillar-pins and chains. U U ſtandard-pins and chains. W beam-pins and chain. X the beam-ring and breaſt-iron pin and chain. Y the gate. Z the heart and links.

A B the beam nail. A C, A C, two holes in the ſtandard-head through which the plough-line paſſes.

S the horſe-tree, or bodkin, fixed by the claſp (2) to the the heart (Z) on the gate Y. 3 3 two claſps on each end of the horſe-tree (S) to which the hamble-trees, or weas, (4 4) are fixed, on each of which are two claſps (5 5 5 5) to receive the horſe traces.

Observations.

Firſt. The holes in the ſtandard (T T) are to raiſe or lower the pillar S by means of the ſtandard-pins (U U) which is one way of ſetting the plough deeper or ſhallower in the land; but when once fitted to a proper ſize, it is ſeldom altered by this part, unleſs very deep water-furrows are to be drawn, or the ſhare is much worn.——For the ſame uſe are the different holes in the breaſt-iron Q.

2dly. The holes in the pillar S, are for the pillar-pins V V, to alter the direction of the beam of the plough, either to the furrow or land, according as the furrows want to be thrown either flat or round. The ſame uſe is made of the notches in the gate Y.

3dly. The holes in the beam (B) by which the beam-ring and breaſt-iron (Q) are fixed to the beam by the beam-nail (A B) and alſo by the beam-pin and chain, (W) which is fixed to the top of the ſtandards in the centre, theſe unite the plough and breaſt-work together. By theſe holes the plough is regulated; and ſo nice are the ploughmen in Norfolk in ploughing to a proper depth where there are little inequalities in the land, and upon ſuch juſt mechanical principles is it conſtructed, that a quarter of an inch alteration in the beam-nail and beam-pin will be perceived in the going of the plough either deeper or ſhallower. This will ſcarcely be credited, but I aſſert it upon my own knowledge. The breaſt-pin drawn up half its length, and the beam-nail turned upon its oppoſite quarter, frequently in ploughing a fallow, is enough to ſink the plough perceptibly. By theſe means, one of theſe ploughs will plough almoſt to any depth, or barely ſkim the ſurface.

4thly. The coulter N, when ſet properly, the point ſhould be about three inches for the ſhare, and in ſuch a direction, that a line ſtrained at the hinder part of the ſide-iron to the point of the coulter, ſhould juſt free the ſide of the ſhare. This is the rule the ploughmen ſet it by.

5thly. The plough-line paſſes from the outſide ring of the bit of the halter of the one horſe, through a ring in the beams, and through the hole A C in the ſtandard, and through the ſtaple P in the tail of the plough, and up again through the other hole A C, through a ring in the beam to the ring in the bit of the outſide of the halter on the other horſe. A coupling-line is fixed from the inſide ring of the halter of one horſe to the inſide ring of the other horſe's halter; by this means the ploughman, pulling the line on either ſide of the tail of the plough, readily guides the horſes which way he pleaſes.

6thly. The horſes' traces ſhould be ſo ſhort as barely to clear their hocks when in their work; in fact, the horſes ſhould be brought back as near as poſſible to the point of draught.

7thly. The plough when well conſtructed ſhould, when ſtanding in its work, reſt only upon the hind part of the head (C) and the edge of the ſhare H; in other words, it ſhould have the leaſt poſſible friction.

8thly. Complex as this plough may appear to be, the various methods of altering it are ſo ſimple, that every common ploughman knows how to do it readily.

9thly. The ſuperior advantages of the Norfolk plough over every other ſort that I have ſeen (except thoſe conſtructed on the ſame principles, though varied in their form) are many. A few I will mention, that gentlemen may be better able to judge of its ſuperior utility.

Firſt, It goes with only two horſes without a plough-boy. This, probably, will be matter of ſurprize; but I aver, that two good able horſes with one of theſe ploughs will break up the ſtrongeſt (level) land I ever ſaw in Somerſetſhire, and at a proper ſeaſon will plough nearly an acre in a day. I have myſelf been witneſs to land being broken up whoſe ſurface would make bricks, and ſo hard that near an hundred weight has been put in the chamber of the plough, (the opening between the mould-board and beam) and yet only two horſes have been uſed, and more than half an acre was ploughed in a day.

Another advantage is, having but one handle, which the man holds in his left hand; he carries his whip in the other, and when neceſſary takes the plough-line in it, and direct his horſes to right or left as he chooſes.

A third advantage is, having but one handle, he, by ſtopping his horſes, and ſtepping one ſtep forwards, can, in *half a minute*, take up or let down (raiſe or ſink) his plough in any direction he finds neceſſary. This a good ploughman will do in land that is very uneven, two or three times in a furrow.

A fourth advantage is, having but two horſes, and thoſe going a-breaſt, he can always ſee between them, and by that means draws out his work as ſtrait as a line can be ſtretched, and makes his furrows as true and exact as it is poſſible to be conceived.

Many other advantages could be pointed out, but I have already treſpaſſed on your patience; and to draw compariſons with the plough commonly uſed in the Weſt of England,

land, might to many gentlemen appear invidious. But leſt I lead any into error, permit me to add, that the Norfolk plough is not calculated for ſtony or very hilly land; nor will it break paſture land properly to ſow on one earth.

Your moſt obedient humble ſervant,

Mr. Rack. GEORGE BOSWELL.

ARTICLE LIX.

An account of the Succeſs of a late planted Crop of Potatoes.

GENTLEMEN,

IN the month of June 1782, a gentleman near Bath planted three acres and half of land with potatoes of the long kidney-ſhaped white kind from Ireland. The ſoil was a lightiſh loam, and being virgin earth, no manure of any kind was uſed. The ground was dug about eight or nine inches deep, and the ſeed potatoes cut into ſets, and planted about a foot or fourteen inches apart, in holes made with dibbles. Notwithſtanding the late time of planting, they grew very well, and produced, when taken up in October, three hundred and eighty ſacks of four buſhels each ſack, or nearly four hundred and forty buſhels per

acre.

are. None of them were very ſmall, and few were very large; but moſtly of a good full middling ſize, fit either for the table or planting. Not a plant in this crop was curled, or infected with any diſeaſe.

I am, &c.

Bath, May 1, 1783. T. B.

[N. B. Favourable as the above crop may appear to the late planting of potatoes, we wiſh not to recommend that practice. In the preſent inſtance we are inclined to believe, the uncommon wetneſs of the ſeaſon was the principal cauſe of the crop being ſo large. Had the ſummer proved dry, we think this gentleman's experiment would have proved a loſing one; as the plants would naturally have been ſo ſlow of growth, as for the autumn froſts to check them before they could arrive at full maturity. We conſider the beginning of May the beſt ſeaſon for planting potatoes on a large ſcale; they have then a chance of every advantage which the variety of the ſeaſon affords, without being in any danger of ſuffering from early growth by late ſpring froſts, which (as has been the caſe this ſeaſon) often cut off thoſe planted in the beginning of April.]

ARTICLE LX.

On croſſing the Breed in Sheep and Neat Beaſts.

SIR, March 8, 1783.

ON reading the advertiſement of the Bath Agriculture Society, I was induced to take the liberty of addreſſing to you this letter.

I have rams to let for the ſeaſon from five to twenty guineas. They were bred from ſome of the beſt ſtock of that famous breeder Mr. BAKEWELL, of Diſhley in Leiceſterſhire, a ſort eſteemed the beſt in England, and which Mr. YOUNG, in his Eaſtern Tour, gives a particular account of. They are of the polled kind, and the peculiar benefits ariſing from them are, their hardineſs and extra quantity of wool. The firſt proceeds no doubt from their perfect form, as we have tried them with common ſheep of moſt counties, and always found they have done conſiderably better, though kept exactly alike. *Secondly*, they come to a very great weight. And *laſtly*, inſtead of cutting three or four pounds of wool, which is more than is generally done, I always cut from ſix to fourteen pounds off each ſheep. And as you muſt have in your neighbourhood the beſt judges in this commodity, from the number of hands employed in the woollen manufacture, I have taken the liberty to incloſe you a lock of it for inſpection, and believe they will find it a very good ſtaple.

The wool in paper No. 1, is from a ram ſhorn twice laſt year. That in No. 2, is from a tegg or lamb of laſt year.

A croſs breed from the rams and the common Hampſhire ewes, have been found remarkably profitable, having been ſold lean at two years old for twenty-five ſhillings each, and many have been killed at thirty pounds a quarter, which is remarkable for this poor backward county, and not nearly equalled by any of our neighbours.

The late Lord NORTHINGTON, about twenty-five years ago, had a ram of this kind from Mr. BAKEWELL's father, and the croſs breed from him ſold at great prices to the Dorſetſhire farmers; who found it anſwer ſo well, that the ram lambs from his Lordſhip's farm bore the belle for many years.

Our bulls (bred alſo from Mr. BAKEWELL's ſtock) are from five to twenty guineas the ſeaſon.

Their merit lies in being hardier than even Welſh or Scotch cattle; they are remarkably well-ſhaped and ſmall-boned, and at the ſame time capable of being brought to a greater degree of fatneſs than any other breed whatever.

I have no doubt myſelf but a breed from a bull of this ſort, and the cattle of Somerſet or Devon, would prove eſſentially uſeful, and for the following among other reaſons:——

Your oxen require the beſt paſtures, and that for a long while; and then, from their make, (being ſet high on their legs) they weigh very light when they come to the ſcale. Theſe are their faults; yet they cut with the fineſt grain of any beaſts in England, and fetch more pound for pound than any brought to Smithfield market.

Our beaſts are remarkably ſhort-legged, very broad over their backs, and very quick feeders. I aſſure you that three of them will fatten in the ſame time that two of your's will. I therefore conceive the croſs breed will be very uſeful in thoſe points that the cattle of Somerſet and Devon fail in.——My farm is on a very poor chalky ſoil, and is always open to publick inſpection in reſpect to my cattle.

As Secretary to a publick Society, I look upon you as a publick man, which is my excuſe for this addreſs. You will oblige me much by informing me of the terms of ſubſcription to your Society, with your liſt of premiums for the preſent year. And if you wiſh for information in any thing reſpecting my cattle, I ſhall be happy to give it you.

Should any of the Gentlemen wiſh to procure any of our cattle for the purpoſe of croſs breeding, I ſhall have pleaſure in ſerving them. Nobody can do it better, as I have expended very large ſums in acquiring the beſt breed both for cattle and ſheep.

I am, Sir,

Your very humble ſervant,

BENJAMIN SMITH.

Lye, near Alresford,
Hants.

ARTICLE LXI.

On the Advantages of cultivating Sainfoin as a Food for Cows.

[By an Eſſex Farmer, an Honorary Member.]

GENTLEMEN,

I AM induced to ſend you the following remarks on ſainfoin, from having obſerved when at Bath, and in paſſing through the counties of Somerſet and Dorſet laſt ſummer, that there is but little of this valuable graſs growing there, although many of the lands ſeem well adapted to its nature.

Sainfoin is much cultivated in the North-Eaſt part of this county, particularly about Saffron-Walden, where the ſoil is of a chalky kind. The remarks that follow may be depended on, as they are made from my own experience and obſervation for many years; which have fully convinced me, that of all the foreign graſſes, there is none comparable to this.

Sainfoin will always ſucceed well where the roots run deep; the worſt ſoil of all for it is where there is a bed of cold wet clay, which the tender fibres cannot penetrate. This plant will make a greater increaſe of produce, by at leaſt thirty times, than common graſs or turf on poor land. Where it meets with chalk or ſtone, it will extend its roots through the cracks and chinks, to a very great depth, in ſearch of nouriſhment. The dryneſs is of more conſequence than the richneſs of land for ſainfoin; although land that is both dry and rich will always produce the largeſt crops.

It is very commonly ſown broadcaſt, but it is found to anſwer beſt in drills, eſpecially if the land be made fine by repeated ploughing, rolling, and harrowing. Much depends on the depth which this ſeed is ſown. If it be buried more than an inch deep, it will ſeldom grow; and if left uncovered, it will puſh out its roots above ground, and theſe will be killed by the air. March and the beginning of April are the beſt ſeaſons for ſowing it, as the ſeverity of winter, and the drought of ſummer, are equally unfavourable to the young plants. A buſhel of ſeed ſown broadcaſt, or half that quantity in drills, if good, is ſufficient for an acre. The drills ſhould be thirty inches apart, to admit of horſe-hoeing between them. Much however depends on the goodneſs of the ſeed, which may be beſt judged of by the following marks:—The huſk being of a bright colour, the kernel plump, of a grey or blueiſh colour without, and, if cut acroſs, greeniſh and freſh withinſide. If it be thin and furrowed, and of a yellowiſh caſt, it will ſeldom grow. When the plants ſtand ſingle, and have room to ſpread, they produce the greateſt quantity of herbage, and the ſeed ripens beſt.

But farmers in general, from a miſtaken notion of all that appears to be waſte ground being unprofitable, plant them ſo cloſe, that they choak and impoveriſh each other, and often die in a few years. Single plants run deepeſt and draw moſt nouriſhment; they are alſo eaſieſt kept free from weeds. A ſingle plant will often produce half a pound of hay when dry. On rich land this plant will yield two good crops in a year, with a moderate ſhare of culture. A good crop muſt not be expected the firſt year, but if the plants ſtand not too thick, they will increaſe in ſize the ſecond year prodigiouſly.

No cattle ſhould be turned on the field the firſt winter after the corn is off with which it was ſown, as their feet would injure the young plants. Sheep ſhould not come on the following ſummer, becauſe they would bite off the crown of the plants, and prevent their ſhooting again. A ſmall quantity of ſoaper's aſhes as a top-dreſſing will be of great ſervice, if laid on the firſt winter.

If the ſainfoin be cut juſt before it comes into bloom, it is admirable food for horned cattle; and if cut thus early, it will yield a ſecond crop the ſame ſeaſon. But if it prove a wet ſeaſon, it is better to let it ſtand till its bloom be perfected; for great care muſt be taken, in making it into hay, that the flowers do not drop off, as cows are very fond of them; and it requires more time than other hay in drying.

Sainfoin is ſo excellent a fodder for horſes, that they require no oats while they eat it, altho' they be worked hard all the time. Sheep will alſo be fattened with it faſter than with any other food.

If the whole ſeaſon for cutting prove very rainy, it is better to let the crop ſtand for ſeed, as that will amply repay the loſs of the hay; becauſe it will not only fetch a good price, but a peck of it will go as far as a peck and a half of oats for horſes.

The beſt time of cutting the ſeeded ſainfoin is, when the greateſt part of the ſeed is well filled, the firſt blown ripe, and the laſt blown beginning to open. For want of this care ſome people have loſt moſt of their ſeed by letting it ſtand too ripe. Seeded ſainfoin ſhould always be cut in a morning or evening, when the dews render the ſtalks tender. If cut when the ſun ſhines hot, much of the ſeed will fall out and be loſt.

An acre of very ordinary land, when improved by this graſs, will maintain four cows very well from the firſt of April to the end of November; and afford beſides a ſufficient ſtore of hay to make the greater part of their food the four months following.

The quantity of milk produced by cows fed by ſainfoin, is nearly double to that of any other food. The milk is alſo much richer, and will yield a larger quantity of cream. The butter will alſo be better coloured and flavoured than any other. I have known many cows give twelve pints of milk at a meal, and milked twice a day, while fed on ſainfoin.

If the ſoil be tolerably good, a field of ſainfoin will laſt from fifteen to twenty years in prime; but at the end of ſeven or eight years it will be neceſſary to lay on a moderate coat of well-rotted dung; or, if the ſoil be very light and ſandy, of marle. By this means the future crops, and the duration of the plants in health and vigour, will be greatly increaſed and prolonged. Hence it will appear, that for poor land there is nothing equal to this graſs in point of advantage to the farmer.

"Clover will laſt only two years in perfection; and often, if the ſoil be cold and moiſt, near half the plants will rot, and bald patches be found in every part of the field the ſecond year. Beſides, from our frequent rains during the month of September, many crops left for ſeeding are loſt.

But from the quantity and excellent quality of this graſs [ſainfoin] and its ripening earlier, and continuing in vigour ſo much longer, much riſque and certain expence is avoided, and a large annual profit accrues to the farmer.

I am, Gentlemen,

Your moſt obedient humble ſervant,

P. W.

March 21, 1781.

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Article LXII.

On the Turnip Husbandry.

[By a Gentlemen in Norfolk.]

Sir,

IN cultivating Turnips to advantage, great care ſhould be taken to procure good, bright, nimble, and well-dried ſeed, and of the beſt kind.

The Norfolk farmers generally raiſe the oval white, the large green-topped, and the red or purple-topp'd kinds, which from long experience they have found to be the moſt profitable.

The roots of the green-topp'd will grow to a large ſize, and continue good much longer than others. The red or purple-topp'd will alſo grow large, and continue good to the beginning of February; but the roots become hard and ſtringy ſooner than the former.

The green-topp'd growing more above ground, is in more danger of ſuſtaining injury from ſevere froſt than the red or purple, which are more than half covered by the ſoil, but it is the ſofteſt and ſweeteſt when grown large, of any kind. I have ſeen them brought to table a foot in diameter, and equally good as garden turnips.

Turnips delight in a light ſoil, conſiſting of ſand and loam mixed; for when the ſoil is rich and heavy, although the crop may be as great in weight, they will be rank, and run to flower earlier in ſpring.

Turnip-ſeed, like that of grain, will not do well without frequent changing. Our Norfolk ſeed is ſent to moſt parts of the kingdom, and even to Ireland, but after two years it degenerates; ſo that thoſe who wiſh to have turnips in perfection ſhould procure it freſh every year from Norwich, and they will find their account in ſo doing. For from its known reputation, many of the London ſeedſmen ſell, under that character, ſeed raiſed in the vicinity of the metropolis, which is much inferior in quality.

The only riſk in ſowing turnips is the danger of their being eaten by the fly, eſpecially in a dry ſeaſon. This is an evil for which art has not yet found a certain and effectual remedy. Many things have been tried, but none have anſwered in all caſes. The following have, however, often proved of ſervice:—A ſmall quantity of ſoot ſown over the land at their firſt appearance.—Branches of elder with the leaves bruiſed, drawn in a gate over them.—Muſk mixed with the ſeed before it is ſown.—And ſulphur burnt under it, after moiſtening it with water in which tobacco has been ſteeped.

But ſhowers on the plants as ſoon as they appear above ground, are the beſt preſervatives. They enfeeble and kill the fly, and haſten the plants into the rough leaf, in which ſtate they are out of danger.

When the plants have got five leaves, they ſhould be hoed, and ſet out at leaſt ſix inches apart. A month afterwards, or earlier if it be a wet ſeaſon, a ſecond hoeing ſhould take place, and the plants be left at leaſt fourteen inches diſtant from each other, eſpecially if intended for feeding cattle, for where the plants are left thicker, they will be proportionably ſmaller, unleſs the land is very rich indeed.

Some of our beſt farmers ſow turnips in drills three feet aſunder, and at a ſecond hoeing leave them a foot apart in the rows. By this means the trouble and expence of hoeing is much leſſened, and the crop of equal weight as when ſown in the common method. The intervals may eaſily be cleared of weeds by the horſe-hoe.

Great quantities of turnips are raiſed with us every year for feeding black cattle, which turn to great advantage.

It is well known, that an acre of land contains 4840 ſquare yards, or 43560 ſquare feet; ſuppoſe then that every ſquare foot contains one turnip, and that they weigh only two pounds each on an average, here will be a maſs of food excellent in kind of forty-ſix tons per acre, often worth from four to five guineas, and ſometimes more.

Extraordinary crops of barley frequently ſucceed turnips, eſpecially when fed off the land. In feeding them off, the cattle ſhould not be ſuffered to run over too much of the ground at one, for in that caſe they will tread down and ſpoil twice as many as they eat. We generally confine them by hurdles to as much as is ſufficient for them in one day. By this mode the crop is eaten clean, the ſoil is equally trodden, which, if light, is of much ſervice, and equally manured by the cattle.

A notion prevails in many places, that mutton fattened with turnips is thereby rendered rank and ill-taſted; but this is a vulgar error. I know that the beſt mutton in this county (and few counties have better) is all fed with turnips. It is rank paſture, and marſhy land, that produces rank mutton.

If the land be wet and ſpringy, the beſt method is to draw and carry off your turnips to ſome dry paſture; for the treading of the cattle will not only injure the crop, but render the land ſo ſtiff, that you muſt be at an additional expence in ploughing.

Perhaps, Gentlemen, I ought to aſk pardon for having troubled you with ſo long a letter; but however I may have failed in the execution, my deſign is to excite your attention to a ſubject of much importance in agriculture; the exact knowledge of which may tend to introduce improvements in this branch of cultivation, not yet generally practiſed in the Weſtern counties.

I am, Gentlemen,

Your humble ſervant,

E. N.

B——, Feb. 21, 1781.

ARTICLE LXIII.

On the Culture of Hemp and Flax.

[In a Letter to the Secretary.]

SIR,

I BEG leave to trouble the Gentlemen of the Bath Society with a few remarks on the culture of hemp and flax, as being articles of great nationa importance, and therefore well worthy their attention.

I have often obſerved, that the greater part of thoſe rich marſhy lands lying to the weſt of Mendip-hills, are as badly managed as any in this county, or perhaps in the kingdom. The farmers, whoſe property it is, ſeem content with the produce it affords them without much cultivation or labour; and appear to be utter ſtrangers to its real value, or the profits that would ſpeedily ariſe from a ſpirited and judicious mode of management, were it but adopted. Almoſt any method of cultivation different from the preſent would, in point of private advantage, be infinitely preferable. But were theſe lands appropriated to hemp and flax, they would prove highly advantageous both to the land-holders and the publick at large.

It is well known, that ſoils naturally rich and fertile will produce hemp and flax in abundance; and as theſe are ameliorating crops, they will not, if cut without ſeeding, impoveriſh the land. And as the beſt crops of flax are raiſed from foreign ſeed, (which is eaſily procured cheaper than we can raiſe it) there is the leſs occaſion for ſuffering it to ſeed in this country.

The vaſt quantities of hemp and flax which have been raiſed on lands of the ſame kind in the Lincolnſhire marſhes, and the fens of the Iſle of Ely and Huntingdonſhire, are a full proof of the truth of my aſſertion; and a convincing argument of the ſuperior wiſdom of the farmers in thoſe places. This will appear in a ſtill ſtronger light, when we conſider, that the other commodities raiſed on ſuch land ſell at higher prices than in this county.

Many hundreds of acres in the above-mentioned places, which for paſturage or grazing were not worth more than twenty or twenty-five ſhillings per acre, have been readily let at four pounds the firſt year, three pounds the ſecond, and forty ſhillings the third. The reaſon of this ſuppoſed declining value of the land, in proportion to the number of years ſown with flax, is, that it is uſual with them to ſeed it for the purpoſe of making oil, that being the principal cauſe of the land being thereby impoveriſhed.

It will not appear ſtrange, that ſuch rents ſhould be given for lands which produce from fifty to ſeventy ſtone per acre, which, when dreſſed, ſell on the average from ſeven to nine ſhillings a ſtone, or twenty-four pounds value per acre.

But the profitable growth of hemp and flax is not confined to rich ſoils. Experience hath evinced, that they will grow well on poor ſandy land, if a little expence be beſtowed in manuring it.

Spalding-Moor in Lincolnſhire is a barren ſand, and yet, with proper care and culture, it produces the fineſt hemp in England, and in large quantities.

In the Iſle of Axholme, in the ſame county, equal quantities are produced; for the culture and management of it is the principal employ of the inhabitants; and, according to LELAND, was ſo in the reign of Henry VIIIth.

In marſh land, the ſoil is a clay or ſtrong warp, thrown up by the river Ouze, and of ſuch a quality, that it cracks with the heat of the ſun till a hand may be put into the chinks or openings; yet if once it be covered with the hemp or flax before the heats come on, the ground will never crack or open that ſummer.

When the land is ſandy, they firſt ſow it with barley, and the following ſpring they manure the ſtubble with horſe or cow-dung, and plough it under. They then ſow their hemp or flax, and harrow it in with a light harrow having ſhort teeth. A good crop deſtroys all the weeds, and makes it a fine fallow for flax in the ſpring. As ſoon as the flax is pulled, they prepare the ground for wheat. Lime, marle, and the mud of ponds, is an excellent compoſt for hemp lands.

The quantity of hemp and flax yearly imported into this kingdom, was, about the year 1763, eſtimated at about eleven thouſand tons;* and I will venture to aſſert, that all this quantity might be grown at home, without making a ſcarcity or conſiderably enhancing the price of any article of our preſent produce, or occaſioning any want of hands for carrying on our manufactures. On the contrary, I am induced to believe, it would occaſion a conſiderable increaſe of people, by inviting numbers from the continent to come and ſettle amongſt us. And as the hemp and flax we import come from countries where the balance of trade turns in their favour, it would be a great national advantage.

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* To raiſe this quantity at home would require about 60,000 acres of land.

It ought alſo to be remembered, that the hemp raiſed in this kingdom is not of ſo dry and ſpongy a nature as that we have from Peterſburgh. The only objection that our rope-makers urge againſt uſing Engliſh hemp is, that it takes leſs tar than the foreign to manufacture it into cordage. But as tar is cheaper than hemp, they uſe this argument only becauſe there is leſs profit ariſes to them from working it. This is therefore a ſubſtantial argument in its favour. And this inference may be juſtly drawn from the objection, viz. that the cordage made of Engliſh hemp, when compared with that of the ſame dimenſions worked with foreign, muſt be ſtronger in proportion as there is more hemp and leſs tar in it, provided there be a ſufficient quantity to unite the fibres together; hemp being a ſtronger and more durable ſubſtance than tar.

One peculiar advantage attending the cultivation of hemp and flax is, that a crop of the former prepares the land for the latter, and therefore a crop of hemp is clear gain to the farmer. That theſe plants impoveriſh the ſoil, is a mere vulgar notion, devoid of all truth. The beſt hiſtorical relations, and the verbal accounts of honeſt ingenuous planters, concur in declaring it to be a vain prejudice, unſupported by any authority; and that theſe crops really meliorate and improve the ſoil.

Therefore as hemp and flax can be raiſed at home ſo much to the improvement of our lands, the employment of our poor, and the intereſt of the nation at large, I am very ſolicitous that this ſubject may come ſeriouſly under the conſideration of your Annual Meeting, and receive all poſſible encouragement from your publick-ſpirited, and truly laudable Society.

I am, Gentlemen,

Your humble ſervant,

A Dorsetshire Gentleman.

Dec. 8, 1781.

ARTICLE LXIV.

Directions for deſtroying Rats in Farm-Yards.

GENTLEMEN, Earnly, Feb. 15, 1782.

AS Rats are a ſpecies of vermin very prejudicial to the farmer, I think every method recommended to deſtroy them merits attention; and therefore ſend you the following, which, after trying a multitude of other things, I found moſt ſucceſsful.

To a quart of oatmeal, I put ſix drops of rhodium, a grain of muſk, and two or three nuts of nux vomica finely powered.

This mixture I made up into pellets, and laid them in the holes where the rats frequented. This was at firſt greedily eaten, and did great execution; but theſe ſagacious animals ſoon diſcovered their enemy, and ſwallowed the bait no more.

I then tried the following:—To three parts of oatmeal, I put a fourth of ſtaves-acre powdered, mixed them well, and made into a paſte with honey. I laid pieces of this in the holes, and ſo many were killed by it, that my houſe and barns became very diſagreeable by the ſmell of them when dead.

To prevent this inconvenience, I then endeavoured to take them alive. To effect this purpoſe, I trailed toaſted cheeſe and red herrings from their holes into an empty room, where I placed oatmeal and other ſorts of food they are moſt fond of, and permitted them to eat it without interruption. On finding, from their not being moleſted, that their numbers increaſed, I ſet a large box into this room with its ſide downward, and the lid being liſted up, was ſuſpended in that poſition by a ſtring run through, or over a pully in the cieling, the end of which was placed within reach, when a ſufficient number were eating in the box, in which I placed oatmeal and ſuch other food as they are fond of. At firſt they entered the box with caution, but in three or four nights they went in boldly, and would eat there like pigs at a trough. It being moonlight, I watched them one evening, and having painted the inſide of the box white, I could eaſily diſcover when it was full; the fifth night, on pulling the ſtring, I let down the lid upon them, which being loaded with a large ſtone to prevent their puſhing it open, I ſecured upwards of ſixty at once; and repeating the experiment, in about three weeks I caught near eight hundred of theſe vermin.

By this method I ſo effectually cleared my premiſes, that I have ſuſtained but little damage ſince.

I am, your humble ſervant,

M. N.

Article LXV.

On the Management of Seed Barley in a dry Seaſon.

[Communicated by a Gentleman of Yorkſhire]

IT is well known that Barley is leſs valuable when it does not ripen equally; that barley which comes up ſpeedily in a duſty ſoil, muſt gain a great advantage over ſeed weeds; and this year barley that ſhall come a fortnight or three weeks earlier than others to market, will probably draw a higher price.

Therefore, firſt take out about one-third of the contents of the ſacks of ſeed barley or bere, to allow for the ſwelling of the grain. Lay the ſacks with the grain to ſteep in clean water; let it lie covered with it for at leaſt 24 hours. When the ground is ſo dry as at preſent, and no likelihood of rain for ten days, it is better to lie 36 hours. Sow the grain wet from ſteeping, without any addition of powdered quick-lime, which, though often recommended in print, can only poiſon the ſeed, ſuck up part of its uſeful moiſture, and burn the hands of the ſower. The ſeed will ſcatter well, as clean water has no tenacity—only the ſower muſt put in a fourth or a third more ſeed in bulk than uſual of dry grain, as the grain is ſwelled in that proportion: harrow it in as quickly as poſſible after it is ſown; and though not neceſſary, give it the benefit of freſh furrow, if convenient. You may expect it up in a fortnight at fartheſt.

My ſteeped barley, ſown on the 10th and 11th of April, is now from four to ſix inches high; and what was ſown on Saturday the 19th and Monday the 21ſt of April, on a ley holm, above a month ploughed, is this day, or in the ſpace of a fortnight, fairly come up; and the head-ridges, eſpecially one that was recently ploughed, though ſown on the 25th, is beginning to appear. But the ſteeped ſeed running ſhort, my overſeer ſowed about a rood on the freſh ploughed head-ridge, with unſteeped barley, where not a plant as yet appears; but, on the contrary, the grain may be found in the ſoil as dry, hard, and wrinkled on the ſkin, as when taken from the granary. In this uncommonly dry ſeaſon, I need not point out other inſtances of grain much longer ſown, not as yet come up. I ſhall only add, that I have uniformly followed this method for above a dozen years with unvaried ſucceſs.

WILLIAM COPLAND.

Blackwood, near Dumfries,
May 3, 1783.

END
OF
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with unſteeped barley, where not a plant as yet appears; but, on the contrary, the grain may be found in the ſoil as dry, hard, and wrinkled on the ſkin, as when taken from the granary. In this uncommonly dry ſeaſon, I need not point out other inſtances of grain much longer ſown, not as yet come up. I ſhall only add, that I have uniformly followed this method for above a dozen years with unvaried ſucceſs.

WILLIAM COPLAND.

Blackwood, near Dumfries,
May 3, 1783.

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